

OF ADA 055767



NATIONAL BUREAU OF STANDARDS

USARTL-TR-78-1B

557

FILE COPY,



ROTOR WAKE EFFECTS ON HUB/PYLON FLOW
Volume II, Program SHAPES User's Manual

Paul Soohoo Richard B. Noll Luigi Morino Norman D. Hamm AUSS and



Aerospace Systems, Inc. Burlington, Mass. 01803

May 1978

Final Report for Period June 1975 - September 1977

Approved for public release; distribution unlimited.

Prepared for

APPLIED TECHNOLOGY LABORATORY

U. S. ARMY RESEARCH AND TECHNOLOGY LABORATORIES (AVRADCOM)

Fort Eustis, Va. 23604

APPLIED TECHNOLOGY LABORATORY POSITION STATEMENT

This report presents a method for determining aerodynamic characteristics of helicopter shapes under the influence of the main rotor wake. The method is condidered to be worthy of publication for dissemination of information and the stimulation of further related research. The reader is cautioned that this method does not predict flow separation as the title would imply, nor does the rotor wake fully impinge upon the body of the helicopter. The method is useful, however, as a design tool in determining rotor-fuselage aerodynamic interference.

Mr. F. A. Raitch of the Aeromechanics Technical Area served as project engineer for this effort.

DISCLAIMERS

The findings in this report are not to be construed as an official Department of the Army position unless so designated by other authorized documents.

When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission, to manufacture, use, or sell any patented invention that may in any way be related thereto.

Trade names cited in this report do not constitute an official endorsement or approval of the use of such commercial hardware or software.

DISPOSITION INSTRUCTIONS

Destroy this report when no longer needed. Do not return it to the originator.

Unclassified SECURITY CLASSIFICATION OF THIS PAGE (When Date Entered) READ INSTRUCTIONS
BEFORE COMPLETING FORM REPORT DOCUMENTATION PAGE RECIPIENT'S CATALOG NUMBER USARTL TYPE OF REPORT & PERIOD COVERED ROTOR WAKE EFFECTS ON HUB/PYLON FLOW.
Volume II. Program SHAPES User's Manual. Final Report. June 175 - S AST-TR-76-38 . AUTHOR(a) Paul Soohoo, Luigi Morino DAAJ02-75-C-0041 Cm Richard B./Noll, Norman D./Ham PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS 62209A IF262209AH76 Aerospace Systems, Inc. 00 087 EK Burlington, Massachusetts 01803 1. CONTROLLING OFFICE NAME AND ADDRESS 2. REPORT DATE Applied Technology Laboratory May 1978 U.S. Army Research & Technology Labs (AVRADCOM)
Fort Eustis, Virginia 23604 NUMBER OF PAGES 4. MONITORING AGENCY NAME & ADDRESS(If different from Controlling Office) 5. SECURITY CLASS. (of this report) Unclassified 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE 16. DISTRIBUTION STATEMENT (of this Report) Approved for public release; distribution unlimited. 17. DISTRIBUTION STATEMENT (of the ebetract entered in Block 20, It different from Report) 18. SUPPLEMENTARY NOTES Volume 11 of a two-volume report. 19. KEY WORDS (Continue on reverse side if necessary and identity by block number) Helicopter Rotors Hub/Pylon Flow Separation Induced Drag Finite Element Aerodynamics Potential Aerodynamics Aerodynamic Computer Program Rotor Wake ABSTRACT (Continue on reverse eith if necessary and identify by block number) An investigation has been conducted to demonstrate the use of the Green's function method to study rotor wake effects on helicopter hub/pylon flow. This report consists of two volumes which document the theoretical formulation and the use of the digital computer program SHAPES (Subsonic Helicopter Aerodynamics Program with Effects of Separation). Volume I presents the theoretical formulation and corresponding numerical procedure for the study of incompressible potential aerodynamics with separated flow. While the

DD 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE (When De

389704 78 06 26

SECURITY CLASSIFICATION OF THIS PAGE(When Data Entered)

20. Abstract (Continued)

formulation is valid for fully unsteady aerodynamics, this report is mainly concerned with rotor aerodynamics. A potential flow aerodynamic program, SHAPES, with suitable rotor wake representation was developed to predict the separation characteristics of arbitrary three—dimensional helicopter configurations. In particular, the effect of the rotor blade wake, blade shank wake, and hub wake in the separation of the flow over a lifting helicopter in forward flight is analyzed.

The present method has potential application in the design of helicopters because it provides an analytical capability which can be used to develop low-drag profile as well as to explore problem areas. Extensive numerical results obtained from Program SHAPES demonstrated the flexibility and accuracy of the method. These results are in excellent agreement with existing data.

Volume II, The User's Manual, describes the structure and use of Program SHAPES. SHAPES is written in FORTRAN IV for operation on the CDC 6600 digital computer system at the Applied Technology Laboratory, U.S. Army Research and Technology Laboratories (AVRADCOM), Fort Eustis, VA. The User's Manual (Volume II) contains detailed information for preparing an input data deck and interpreting the computed data; a discussion of various subroutines, flow charts, common storage and definition of FORTRAN variables; sample cases to illustrate the program output; and a FORTRAN listing of the program.

PREFACE

This report, prepared by Aerospace Systems, Inc. (ASI), Burlington, Massachusetts, for the U.S. Army under Contract DAAJ02-75-C-0041, documents the results of research performed during the period June 1975 to September 1977. The study was sponsored by the Eustis Directorate, U.S. Army Air Mobility Research and Development Laboratory,* Fort Eustis, Virginia, with Mr. Frederick A. Raitch serving as Technical Monitor.

The effort was directed by Mr. John Zvara, President and Technical Director of ASI. Mr. Paul Soohoo served as Principal Technical Staff Member under the supervision of Mr. Richard B. Noll, Vice President of ASI. Dr. Luigi Morino, Director of Computational Continuum-Mechanics Program at Boston University, and Dr. Norman D. Ham, Director of the V/STOL Technology Laboratory at MIT, contributed to the study as Principal Consultants.



^{*}Redesignated Applied Technology Laboratory, U.S. Army Research and Technology Laboratories (AVRADCOM), effective September 1, 1977.

TABLE OF CONTENTS

Section		Page
	PREFACE	3
	LIST OF ILLUSTRATIONS	6
	LIST OF TABLES	6
1	INTRODUCTION	7
2	COMPUTER PROGRAM SHAPES	8
3	PROGRAM SHAPES DESCRIPTION	11
	3.1 Program SHAPES Organization	11
	3.1.1 Geometric Preprocessor	11
	3.1.2 Coefficient Matrix	16
	3.1.3 Pressure Distribution and Force	16
	3.2 Flow Chart	17
	3.3 Common Block Storage	17
	3.4 FORTRAN Variables	17
4	PROGRAM SHAPES USAGE	26
	4.1 Input Description	26
	4.2 Error Codes	47
5	PROGRAM OUTPUT	48
6	PROGRAM LISTING	49

LIST OF ILLUSTRATIONS

Figure		Page
1	Finite Element Representation of Arbitrary Helicopter Fuselage	8
2	Typical Helicopter Configuration	10
3(a)	Helicopter Fuselage Surface Numbering	13
3(b)	Helicopter Rotor Surface Numbering	14
4	Flow Chart for SHAPES Program	20
5	Program SHAPES Data Setup	45
6	Basic Geometric Inputs for Helicopter Fuselage	46
	LIST OF TABLES	
Table		Page
1	Description of Main Program and Subroutines	18
2	Program SHAPES Common Block Organization	22
3	FORTRAN Variables	23
4	Input Description	27
5	Error Codes Summary	47

SECTION 1

INTRODUCTION

This volume describes the structure and use of a digital computer program, SHAPES, Subsonic Helicopter Aerodynamic Program with Effects of Separation, which was developed by Aerospace Systems, Inc. (ASI), to analyze the incompressible potential aerodynamics of helicopter configuration with rotor wakes and separation effects. Volume I of this report contains a complete description of the theoretical formulation and corresponding numerical procedure for the aerodynamic method for use in the computer program. It also includes extensive numerical results showing the flexibility and accuracy of the method as well as comparison with several existing results. Proper use of SHAPES is predicated on the assumption that the user is familiar with the techniques and limitations set forth in Volume I.

SHAPES is written almost entirely in FORTRAN IV for operation on the CDC 6600 digital computer system at the Applied Technology Laboratory, U.S. Army Research and Technology Laboratories (AVRADCOM), Fort Eustis, Virginia. The program was developed with a highly modular structure for ease of program checkout, to simplify the user's understanding of the program, and to facilitate any modifications that might be required for future applications.

Sections 2 and 3 contain programming details of SHAPES: functions of the various routines, flow charts, common storage, and definition of FORTRAN variables. The use of the program is presented in Section 4. Sample cases are presented in Section 5 to illustrate the output of Program SHAPES. Section 6 contains the FORTRAN listing of the program.

SECTION 2

COMPUTER PROGRAM SHAPES

Computer program SOUSSA (Steady Oscillatory Unsteady Subsonic and Supersonic Aerodynamics) discussed in Subsection 2.2 of Volume I has been modified to include rotor dynamics and separation from hub/pylon components. The revised program is called SHAPES, for Subsonic Helicopter Aerodynamic Program with Effects of Separation. Geometry preprocessor for single-rotor helicopter configurations is included in Program SHAPES.

In Program SHAPES the user need not be familiar with the aerodynamic portion of the program, unlike other sophisticated aerodynamic programs in which the choice for the combination of various aerodynamic functions (sources, doublets, vortices) is an art which requires considerable understanding of the method. Another advantage of SHAPES is that the paneling used for the aerodynamics is completely arbitrary and, therefore, may coincide with the one used for structural analysis. A typical finite element representation of a helicopter fuselage configuration is shown in Figure 1.

The aerodynamic paneling can be accomplished manually by inputting the coordinates

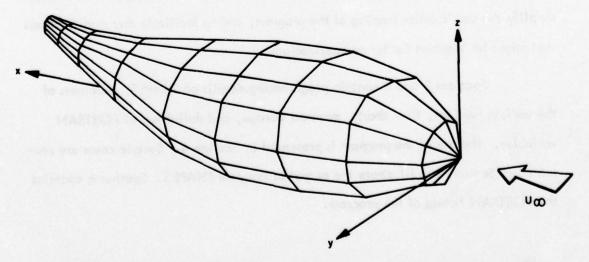


Figure 1. Finite Element Representation of Arbitrary Helicopter Fuselage.

of the corner points of all selected aerodynamic panels or by using a geometry preprocessor. A geometry preprocessor for conventional helicopter configurations (see
Figure 2) is incorporated in SHAPES. The fuselage is assumed to have an elliptical
center section with the nose and tail approximated by elliptical paraboloids. An
ellipsoidal element is used to approximate the rotor hub and pylon sections. In addition, the rotor shaft and blade shank are represented by cylindrical sections. Given
the helicopter configuration geometry, the preprocessor computes the corner point
locations of required aerodynamic panels for the complete helicopter configuration.
Required inputs include:

- Shape and dimensions of fuselage, pylon, shaft, and hub
- Number of blades
- Rotor diameter
- Extent of root cutout or shank
- Cross-section of shank
- Rotor blade airfoil designation
- Rotor blade chord distribution
- Rotor blade thickness distribution
- Rotor blade twist distribution
- Rotor tip speed
- Freestream velocity
- Rotor wake geometry

This capability eliminates the requirement for the selection of the aerodynamic paneling by the user.

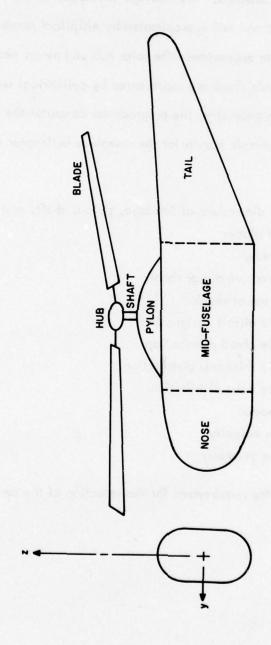


Figure 2. Typical Helicopter Configuration.

SECTION 3 PROGRAM SHAPES DESCRIPTION

This section contains a brief description of the organization of Program
SHAPES and its subroutines, a flow diagram, a table of common block storage, and a
list of FORTRAN variables.

3.1 PROGRAM SHAPES ORGANIZATION

The present computer program for incompressible potential aerodynamics with separated flow for a complete helicopter, i.e., fuselage, pylon, and rotor, contains three main parts: (1) geometric preprocessor, (2) coefficient matrix, and (3) pressure distribution and force. Based on data provided, the geometric preprocessor automatically generates the aerodynamic panels for the helicopter as well as the numbering and location of the panel corner points in the reference Cartesian (global) coordinate system. The matrix coefficients are determined by evaluating the doublet and source integrals over the surface of the aerodynamic panels. This yields N simultaneous linear equations with N unknown velocity potentials at the centroids of N elements. A standard IBM subroutine GELG (Gaussian elimination method) is used to solve for the unknown potentials. To obtain a continuous distribution for the velocity potential, an averaging scheme is introduced. Hence, the perturbation velocities and the pressure at the centroid of each element can be evaluated. Finally, the aerodynamic coefficients, i.e., lift and induced drag, are computed.

3.1.1 GEOMETRIC PREPROCESSOR

Presently, five main subroutines form the geometric preprocessor:

- DATA
- PREPRO

- COODPT
- GEOMET
- VEC123

Basic geometric inputs of the problem are defined by the user in DATA. This subroutine automatically generates the global subsurface numbering of the complete helicopter geometry; i.e., fuselage, pylon, shaft, hub, shank, blade, and vertical tail sections. Figure 3 shows the subsurface global numbering for the helicopter fuselage and rotor configurations. One important input for DATA is the number of the elements in the x and y directions for each subsurface, IS. This input controls the total number of aerodynamic panels used to model the geometry of the problem.

The variation of the element sizes (uniform or nonuniform finite element breakup) is another basic input parameter to the program. In the present investigation, particular attention must be paid to the flow field in the vicinity of the rotor shaft, pylon, hub, and upper fuselage elements. Hence, small elements are prescribed for the hub/pylon region, whereas larger elements can be used on the lower fuselage section. Moreover, the local curvilinear coordinates § and ¶ are automatically defined so that the normal to each surface panel is always directed outward.

Finally, DATA automatically defines the parameter KWAKES, which has the value 1 if the subsurface, IS, generates a wake and a value of 0 otherwise. For example, KWAKES = 1 on the pylon. A vortex-layer wake is assumed to emanate from the separation point and this is represented as a doublet layer.

Subroutine PREPRO generates a nodal function NOFCT (IXY, IS), which relates the local nodal numbering, IXY, with the required global nodal numbering.

Next, the Cartesian coordinates of these nodes is obtained by COODPT. Basic inputs required for COODPT are the shape and overall dimensions of the fuselage, pylon, and

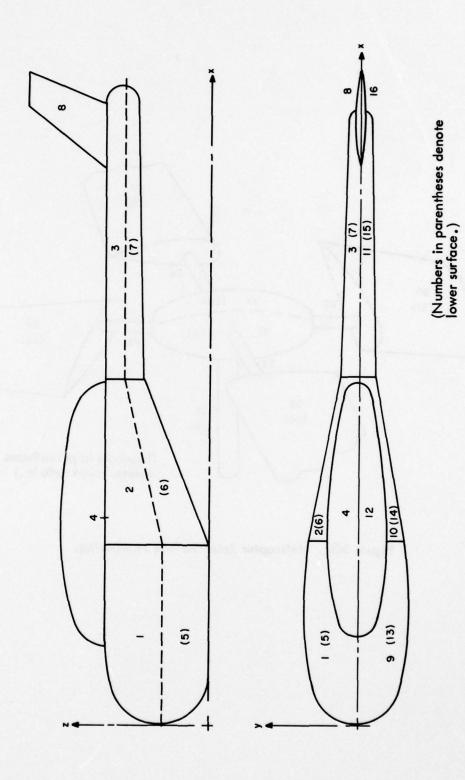


Figure 3(a). Helicopter Fuselage Surface Numbering.

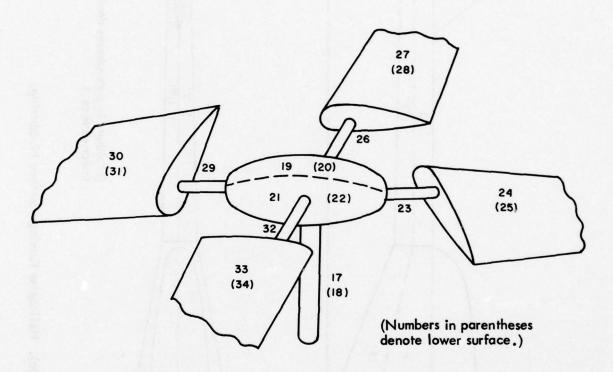


Figure 3(b). Helicopter Rotor Surface Numbering.

hub sections, blade-twist distribution, blade thickness, chord distribution, number of rotor blades, rotor diameter, and extent of root cutout (shank). Subroutine GEOMET automatically generates a parameter NCDE as a function of the corner point ICORNR for each aerodynamic panel of the helicopter. Finally, VEC123 completes the geometry of the aerodynamic panel (hyperboloidal element) that contains the four corner points of the element. This results in continuity of the complete helicopter geometry. Note that the equation that represents a hyperboloidal element is given by

$$\bar{P} = \bar{p}_0 + \bar{p}_1 \xi + \bar{p}_2 \eta + \bar{p}_3 \xi \eta$$
 (1)

where

$$\begin{pmatrix}
\overline{p}_{0} \\
\overline{p}_{1} \\
\overline{p}_{2} \\
\overline{p}_{3}
\end{pmatrix} = \frac{1}{4} \begin{pmatrix}
1 & 1 & 1 & 1 \\
1 & 1 & -1 & -1 \\
1 & -1 & 1 & -1 \\
1 & -1 & -1 & 1
\end{pmatrix} \begin{pmatrix}
\overline{p}_{pp} \\
\overline{p}_{pm} \\
\overline{p}_{mp} \\
\overline{p}_{mm}
\end{pmatrix} (2)$$

 \vec{P}_{pp} , \vec{P}_{pm} , \vec{P}_{mp} , and \vec{P}_{mm} denote the Cartesian location of the four corner points and \vec{P}_{0} gives the centroid of the element. This subroutine also performs the Prandtl-Glauert transformation and the rotation of the axis due to angle of attack and angle of sideslip. PRINTA writes the specifications of the problem, node coordinates, the centroid of each element, nodal numbering for each surface, and the nodal numbering of the corner points of the element.

Subroutine CHECK verifies if the maximum permissible number of elements along the x and y directions on each subsurface and the total number of elements are exceeded. Several compatibility conditions exist between the data. If an incompatible relationship is present, an error code will be printed and the execution of the program terminated.

3.1.2 COEFFICIENT MATRIX

Subroutine COEFF forms the matrix coefficients by evaluating the source and doublet integrals over the surface of the aerodynamic panels. The effect of the rotor wake and the presence of separation are automatically included. COEFF yields a system of N linear equations with N unknown velocity potentials at the centroid of N elements. SOLUTN calls GELG to solve N simultaneous linear equations. To obtain the velocity potential at the node of each element, an averaging scheme is employed by AVERAG. Using the value of the velocity potential at the nodes, PHI provides a continuous distribution of the velocity potential. Note that the equation that represents this continuous distribution is given by

$$\varphi = \varphi_0 + \varphi_1 \xi + \varphi_2 \eta + \varphi_3 \xi \eta$$
 (3)

where

$$\begin{cases}
\varphi_{0} \\
\varphi_{1} \\
\varphi_{2} \\
\varphi_{3}
\end{cases} = \frac{1}{4} \quad
\begin{bmatrix}
1 & 1 & 1 & 1 \\
1 & 1 & -1 & -1 \\
1 & -1 & 1 & -1 \\
1 & -1 & -1 & 1
\end{bmatrix}
\begin{cases}
\varphi_{pp} \\
\varphi_{pm} \\
\varphi_{mp} \\
\varphi_{mm}
\end{cases} (4)$$

 $\phi_{pp},~\phi_{pm},~\phi_{mp},~$ and ϕ_{mm} denote the velocity potential at the nodal points and ϕ_{0} gives the value of ϕ at the centroid of the element.

3.1.3 PRESSURE DISTRIBUTION AND FORCE

VELXYZ evaluates the perturbation velocity (Cartesian coordinate system) at the centroid of each aerodynamic panel. Subroutine CPLINR uses Bernoulli's equation to compute the pressure distribution at the centroid. PRINTB writes the distribution of sources, doublets, velocity potential, velocity, and pressure distribution. Finally,

FORCE evaluates the total lift coefficient and induced drag on the helicopter configuration.

A brief description of the main program and subroutines is given in Table 1.

3.2 FLOW CHART

In order to provide a general understanding of the overall program, the flow chart for SHAPES is shown in Figure 4.

3.3 COMMON BLOCK STORAGE

Most FORTRAN—related variables in Program SHAPES used by more than one subroutine are organized into a number of common blocks as shown in Table 2.

3.4 FORTRAN VARIABLES

Table 3 presents definitions of all principal FORTRAN variables used in Program SHAPES. Where appropriate, mathematical definitions are also indicated. The units of each variable are those used internally by SHAPES, and occasionally differ from the input units.

Table 1. Description of Main Program and Subroutines.

	. nglite ranifine a
Preprocessor	
MAIN	Controls the logical flow of information supplied by the subroutines.
DATA	Reads input data.
PREPRO	Defines nodal numbering for the helicopter. (The surface of the helicopter configuration is divided into 34 subsurfaces with a maximum of four rotor blades permitted.)
COODPT	Defines and/or reads in the Cartesian coordinates of the nodes on the surface of the helicopter configuration.
GEOMET	Defines the four nodal corners for each aerodynamic panel.
VEC123	Defines the equation of each hyperboloidal surface (i.e., aerodynamic panel).
PRINTA	Writes specification of the problem, nodal numbering for the helicopter configuration, nodal coordinates, and the centroid of the elements.
CHECK	Verifies if the maximum defined in the main program is exceeded.
DEBUG	Writes error message.
Coefficient Matrix	C months and a second section of the contract
COEFF	Forms the coefficient matrix.
SOLUTN	Calls GELG to obtain the perturbation aerodynamic potential.
GELG	Solves system of general equations by Gauss elimination.
AVERAG	Obtains potential distribution at the nodes by using an averaging scheme.
PHI	Defines a continuous distribution of velocity potential.
Pressure Distribution	on and Force
VELXYZ	Evaluates the velocity (perturbation) distribution at the centroid of each aerodynamic panel.

Table 1. Description of Main Program and Subroutines (Concluded).

CPLINR	Evaluates the pressure distribution at the centroid of each aerodynamic panel (Bernoulli's equation).
FORCE	Evaluates the lift and induced drag coefficients on the helicopter configuration.
PRINTB	Writes the distribution of source, doublet, wake, velocity potential, perturbation velocities, pressure, lift, and induced drag.
Miscellaneous	
A CINIU/V	Evaluates $sinh^{-1}(X)$.
ASINH(X)	
ATANP(X)	Evaluates principal part of tan ⁻¹ (X).

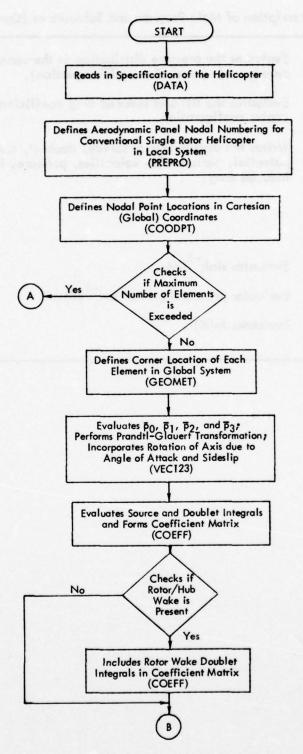


Figure 4. Flow Chart for SHAPES Program.

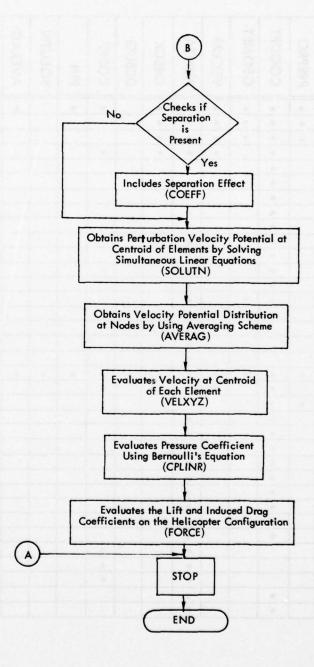


Figure 4. Flow Chart for SHAPES Program (Concluded).

Table 2. Program SHAPES Common Block Organization.

	MAIN	DATA	PREPRO	COODPT	GEOMET	VEC123	PRINTA	CHECK	DEBUG	COEFF	PHI	SOLUTN	AVERAG	VELXYZ	CPLINR	FORCE	PRINTB
ZZZI	*	*	*	*	*	*	*	*		*	*		*	*	*	*	*
ZZZ2	*	*	*	*	*	*	*	*									*
ZZZ3	*	*	*	*	*	*	*	*									*
ZZZ4	*	*		*		*	*	*		*						*	*
ZZZ5	*	*		*			*										*
ZZZ6	*	*		*			*										*
ZZZ7	*	*		*			*										*
ZZZ8	*	*		*			*										*
ZZZ9	*	*		*			*										*
ZZZ10	*	*		*			*	Today.									*
ZZZ11	*	*		*			*										*
ZZZ12	*	*		*			*			*							*
ZZZ13	*	*		*			*										*
ZZZ14	*	*		*	*		*										*
ZZZ15	*	*		*			*										*
ZZZ16	*	*		1 100		010	*										*
ZZZ17	*	*					*										*
ZZZ18	*	*					*										*
ZZZ19	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
ZZZ20	*	*		*		*	*			*				-		-	*
ZZZ21	*	*	*	*			*	W. Co									*
ZZZ22	*	*		*			*										*
ZZZ23	*	*		*			*										*
ZZZ24	*	*		*			*	100									*
ZZZ25	*	*		*			*							-		-	*
ZZZ26	*	*		*			*										*
ZZZ27	*	*		*			*										*
ZZZ28	*	*		*			*										*
ZZZ29	*	*		*	e Haai		*										*
ZZZ30	*	*		*			*						1				*
ZZZ31	*	*					*			*				-			*
ZZZ32	*	*					*			*			-				*
ZZZ33	*	*					*			*				-			*
ZZZ34	*	*		*			*			-			-	-			*
ZZZ35	*	*	-	*	-	-	*		-			-	-	-	-	-	*

Table 3. FORTRAN Variables.

Variable Maximum Name Dimension		Definition
AA	(NESQ)	A coefficient matrix (stored columnwise).
AVG	(NNODE)	The number of elements surrounding the node INODE.
ВС	(NELEM)	Downwash on the centroid of IELEMth element.
СР	(NELEM)	Pressure coefficient at the centroid of the IELEMth element.
HCSI	(11)	Defines the normalized nodal line locations along the x direction for surface IS.
HETA	(11)	Defines the normalized nodal line locations along the y direction for surface IS.
ISFACE	(NS)	Defines the global numbering of the surface IS.
KNORML	(NS)	Indicates the direction of the unit normal on surface IS = 1 outward =-1 inward
KROTOR	(NELEM)	= 1 if the element is on the rotor = 0 otherwise
KROTORS	(NS)	 = 1 if the subsurface is part of the rotor assembly = 0 otherwise
KWAKE	(NELEM)	 1 if the element is in contact with a wake, i.e., rotor blade, hub, pylon, etc. 0 otherwise
KWAKES	(NS)	 1 if the surface IS generates a wake 0 if otherwise
NELEM	lo adi ta tetano a	Total number of elements.
NNODE	roy four and a f	Total number of nodes on the surfaces considered.
NODE	(4, NELEM)	Defines the nodal numbering at the four corners of the element IELEM.
NOFCT	(NXYMP,34)	Defines the nodal numbering of the nodes on the surfaction.
NS		Total number of surfaces considered.

Table 3. FORTRAN Variables (Continued).

Variable Maximum Name Dimension		Definition				
NT	(34)	Subtotal of the number of elements up to, but not including, the surface IS.				
NTMAX	ene de Malien de la	Maximum number of elements permissible on the helicopter.				
NX	(34)	Number of elements along the x direction of the surface IS.				
NXMAX	alfosos sell loss	Maximum number of elements permissible along the x direction on any subsurface.				
NXY	(34)	Total number of elements on the surface IS $[NXY(IS) = NX(IS) * NY(IS)]$				
NXYMP	isk per adlam gele. Paman sida e il	Defines the maximum number of elements permitted or a surface = NXMAX*NYMAX				
NY	(34)	Number of elements along the y-direction of the surface IS.				
NYMAX		Maximum number of elements permissible along the y direction on any subsurface.				
PC	(3, NELEM)	x,y,z coordinates of centroid of elements in the reference Cartesian coordinate system.				
P1	(3, NELEM)	A vector along the ξ direction.				
P2	(3, NELEM)	A vector along the η direction.				
P3	(3, NELEM)	A vector normal to the element IELEM.				
PHIC	(NELEM)	Velocity potential at the center of the element.				
PHI1	(NELEM)	Interpolation coefficient – the local variation of velocity potential along the § direction.				
PHI2	(NELEM)	Interpolation coefficient – the local variation of velocity potential along the η direction.				

Table 3. FORTRAN Variables (Concluded).

Variable Maximum Name Dimension		Definition			
PH13	(NELEM)	Interpolation coefficient – the local variation of downwash.			
SOR	(NNODE)	Velocity potential at the nodes.			
SOURCE	(NELEM)	Source distributions at the centroids of elements. After calling subroutine GELG, this variable stores the velocity potential distributions at the centroids of the elements.			
VELX	(NELEM)	x component of the velocity at the centroids of the elements.			
VELY	(NELEM)	y component of the velocity at the centroids of the elements.			
VELZ	(NELEM)	z component of the velocity at the centroids of the elements.			
XK	(3,NNODE)	Coordinates of the nodes in the reference Cartesian coordinate system.			

SECTION 4

PROGRAM SHAPES USAGE

This section contains a description of the Program SHAPES data input including program options and a description of error codes.

4.1 INPUT DESCRIPTION

All SHAPES data input is accomplished via punched cards. The input variables, required formats, and options are presented in Table 4. Some inputs may require more than one card. The number of input data cards required varies from case to case depending on the type of problem considered. Several compatibility conditions exist among some of the data. If an incompatible relationship is encountered, an error code will be printed and the execution terminated. A typical data setup for running multiple cases is shown in Figure 5.

Table 4. Input Description.

Data 1:	FORMAT (15)		(Main Program)
	NCASE	Number of cases to be run	
Data 2,	3, and 4: FORMAT (20)	A4)	(Subroutine DATA)
	GG(20)	Name, location, date, descrip- tion of job, and remarks	•
Data 5:	FORMAT (2A4, 1015)		(Subroutine DATA)
	GG(2)	Remarks	
	KREAD	Control code for the definition of nodal coordinates = 0 the coordinates will be defined automatically = 1 the coordinates will be read in	
Data 6:	FORMAT (2A4, 1015)		(Subroutine DATA)
	GG(2)	Remarks	
	NS	Number of surfaces considered	
	KSYMMY	Symmetry condition between left and right-hand side of helicopte = -1 if geometry is antisymmet = 0 if geometry has no symmetric = 1 if geometry is symmetric	r ric
	KSYMMZ	Symmetry condition between upper and lower surfaces of helicopter = -1 if geometry is antisymmetric = 0 if geometry has no symmetric = 1 if geometry is symmetric	
Data 7:	FORMAT (2A4,1015)		(Subroutine DATA)
	GG(2)	Remarks	
	NPYLON	Pylon is considered for analysis = 1 yes = 0 no	
	NBODY1	Fuselage nose section is consider = 1 yes = 0 no	ed for analysis

Table 4. Input Description (Continued).

for analysis = 1 yes = 0 no NBODY3 Fuselage tail section is considered for analysis = 1 yes = 0 no NVTAIL Vertical tail is considered for analysis = 1 yes = 0 no **NSHAFT** Rotor shaft is considered for analysis = 1 yes = 0 no NHUB Rotor hub is considered for analysis = 1 yes = 0 no**NSHANK** Blade shank is considered for analysis = 1 yes = 0 no**NBLADE** Rotor blade is considered for analysis = 1 yes = 0 no

Fuselage midsection is considered

Data 8: FORMAT (2A4, 1015)

NBODY2

(Subroutine DATA)

GG(2)

Remarks

KPYL1

Number of elements in the x direction of the mid-fuselage before the pylon

KPYL2

Number of elements in the x direction of the mid-fuselage after the pylon

Data 9: FORMAT (2A4,7F8.3)

(Subroutine DATA)

GG(2)

Remarks

UMACH

Freestream Mach number

OMEGA

Rotor rotational speed (rpm)

AREA

Reference area for evaluating

aerodynamic coefficient

Table 4. Input Description (Continued).

Data 10:	FORMAT (2A4,7F8.3) THE SEL OF KEYGORY - SY	(Subroutine DATA)		
	GG(2)	Remarks			
	ALFA	Angle of attack (degrees)			
	BETA	Angle of sideslip (degrees)			
If NPYL	.ON = 1, use Data 11;	otherwise, skip.			
Data 11:	FORMAT (2A4,7F8.3)		(Subroutine DATA)		
	GG(2)	Remarks			
	XPYCTR)				
	YPYCTR	Coordinates of pylon's center			
	ZPYCTR				
	RXPYL)				
	RYPYL	Radii of pylon section			
	RZPYL	pyron section			
If NVTA	IL = 1, use Data 12; ot	herwise, skip.			
Data 12:	FORMAT (2A4,7F8.3)		(Subroutine DATA)		
	GG(2)	Remarks			
	VSPAN	Span length of vertical tail			
	XLEZV	x coordinate of vertical tail leading edge			
	XTEZV	x coordinate of vertical tail trailing edge			
	TANLEV	Tangent of leading edge sweep angle			
	TANTEV	Tangent of trailing edge sweep angle			
	TAUV	Thickness ratio of vertical tail			
	ZPV	Height of root chord of vertic respect to global Cartesian co system	al tail with ordinate		

Table 4. Input Description (Continued).

If (NBODY1 + NBODY2 + NBODY3) \neq 0, use DATA 13-16; otherwise, skip. Data 13: FORMAT (2A4, 7F8.3) (Subroutine DATA) GG(2) Remarks **XNOSE** XBD1 See Figure 6 XBD2 XTAIL Data 14: FORMAT (2A4,7F8.3) (Subroutine DATA) GG(2) Remarks YNOSE YBD1 See Figure 6 YBD2 YTAIL Data 15: FORMAT (2A4,7F8.3) (Subroutine DATA) GG(2) Remarks ZNOSE ZBD1 See Figure 6 ZBD2 ZTAIL Data 16: FORMAT (2A4,7F8.3) (Subroutine DATA) GG(2) Remarks RYBD1 RZBD1 Radii of fuselage section RYBD2 RZBD2 See Figure 6

Table 4. Input Description (Continued).

If NSHAFT = 1, use Data 17; otherwise, skip.

Data 17: FORMAT (2A4,7F8.3)

(Subroutine DATA)

GG(2)

Remarks

RSHAFT

Radius of rotor shaft

LSHAFT

Length of rotor shaft

If NHUB = 1, use Data 18; otherwise, skip.

Data 18: FORMAT (2A4,7F8.3)

(Subroutine DATA)

GG(2)

Remarks

XHUBCR

YHUBCR

Coordinates of hub center

ZHUBCR

RXHUB

RYHUB

Radii of hub section

RZHUB

If NSHANK = 1, use Data 19; otherwise, skip.

Data 19: FORMAT (2A4,7F8.3)

(Subroutine DATA)

GG(2)

Remarks

RSHANK

Radius of blade shank

LSHANK

Length of blade shank

If (NSHAFT + NHUB + NSHANK + NBLADE) \(\neq 0\), use Data 20-23; otherwise, skip.

Data 20: FORMAT (2A4,7F8.3)

(Subroutine DATA)

GG(2)

Remarks

RROTOR

Blade tip radius

YCUT

Blade root cutout

XBLE

x coordinate of root chord

leading edge

XBTE

x coordinate of root chord

trailing edge

Reference blade at azimuth angle of 90°

Table 4. Input Description (Continued).

TANBLE Tangent of leading edge sweep angle

TANBTE Tangent of trailing edge sweep angle

TAUBL Thickness ratio of blade airfoil

Data 21: FORMAT (2A4,7F8.3) (Subroutine DATA)

GG(2) Remarks

THET75 Blade collective pitch at three-quarter

radius

THETIC Blade lateral cyclic pitch

THETIS Blade longitudinal cyclic pitch

CONING Blade coning angle

AZIMUTH Blade azimuth angle (degrees)

Data 22: FORMAT (2A4,7F8.3) (Subroutine DATA)

GG(2) Remarks

RPITCH Collective pitch angle at blade

root (degrees)

TWIST Blade twist (degrees)

Data 23: FORMAT (2A4,1015) (Subroutine DATA)

GG(2) Remarks

KBLADE Number of blades

ITWIST Defines blade twist distribution

Data 24: FORMAT (2A4,10I5) (Subroutine DATA)

GG(2) Remarks

NWAKPY Flow separation considered

for analysis = 1 yes

= 0 no

Table 4. Input Description (Continued).

NWAKHB Rotor hub wake is generated for analysis

= 1 yes = 0 no

NWAKSK Blade shank wake is generated for analysis

= 1 yes = 0 no

NWAKBL Rotor blade wake is generated tor analysis

= 1 yes = 0 no

If (NWAKHB + NWAKSK + NWAKBL) ≠ 0, use Data 25; otherwise, skip.

Data 25: FORMAT (2A4, 15, 2F8.3)

(Subroutine DATA)

GG(2) Remarks

NSPIRAL Number of elements along one rotor

wake spiral

SPIRAL Number of rotor wake spirals

UWAKE Induced rotor velocity = $\sqrt{1/2} C_T \Omega R$

If NWAKPY = 1, use Data 26-27; otherwise, skip.

Data 26: FORMAT (2A4, 1015)

(Subroutine DATA)

GG(2) Remarks

NSTAG Vortex layer from separation line

is considered for analysis

= 1 yes = 0 no

NVORT Isolated vortex (branch wake) is

considered for analysis

= 1 yes = 0 no

Data 27: FORMAT (2A4,7F8.3)

(Subroutine DATA)

GG(2) Remarks

CSTAG Intensity of the vortex layer

from separation line

CVORT Intensity of the isolated vortex

(branch wake)

Table 4. Input Description (Continued).

Data 28:	FORMAT	(2A4, 1015)
----------	---------------	-------------

(Subroutine DATA)

GG(2) Remarks

KPRINT(I) Output

(PRINT(I) Output control code = 1 yes = 0 no

I = 1 specification of the problem

 2 nodal numbering of surfaces and corner nodal numbering of elements

1 = 3 Cartesian coordinates of the nodes
 1 = 4 Cartesian coordinates of the centroids

of the element

= 5 coefficient matrix AA

= 6 source integrals

7 velocity potential distributions
8 perturbation velocity distributions

= 9 pressure coefficients

I = 10 lift and induced drag coefficients

If NBODY1 = 1, use Data 29; otherwise, skip.

Data 29: FORMAT (2A4, 1015)

(Subroutine DATA)

NX(KS)

Number of elements in x direction

NY(KS)

Number of elements in y direction

NY(KS)

Define the variation of element size

= 0 define by input
= 1 uniform along x direction
= 2 quadratic along x direction

KNSSHP

Defines nose shape

Defines nose shape = 1; $r = R[\xi]^{1/2}$ = 2; $r = R[\xi]^{1/3}$

 $= 3; r = R[\xi]^{1/4}$

KNSTYP Defines nose type

= 1 circular cross section = 2 elliptical cross section

Table 4. Input Description (Continued).

If NBODY2 = 1, use Data 30; otherwise, skip.

Data 30: FORMAT (2A4, 1015)

(Subroutine DATA)

GG(2) Remarks

NX(KS) Number of elements in x direction

NY(KS) Number of elements in y direction

KBDELE Defines the variation of element size

= 0 define by input

= 1 uniform along x direction = 2 quadratic along x direction

KBDSHP Defines the fuselage shape

= 1 cylindrical

KBDTYP Defines the fuselage type

= 1 circular cross section

= 2 elliptical cross section

If NBODY3 = 1, use Data 31; otherwise, skip.

Data 31: FORMAT (2A4, 1015)

(Subroutine DATA)

GG(2) Remarks

NX(KS) Number of elements in x direction

NY(KS) Number of elements in y direction

KTNELE Defines the variation of element size

= 0 define by input

1 uniform along x direction
 2 quadratic along x direction

KTNSHP Defines aft-body shape

 $= 1; r = R\sqrt{\xi}$

 $= 2; r = R [g]^{1/3}$

 $= 3; r = R[\xi]^{1/4}$

KTNTYP Defines aft-body type

= 1 circular cross section

= 2 elliptical cross section

If NPYLON = 1, use Data 32; otherwise, skip.

11 141 15	.C14 - 1, 03e Daid 02,	omerwise, skip.
Data 32:	FORMAT (2A4, 1015)	(Subroutine DATA)
	GG(2)	Remarks
	NX(KS)	Number of elements in radial direction
	NY(KS)	Number of elements in circumferential direction
	KPYELE	Defines the variation of element size = 0 define by input = 1 uniform element distribution along radial and circumferential direction = 2 quadratic along radial direction with uniform element distribution in circumferential direction
	KPYSHP	Defines pylon shape = 1 elliptical
	KPYTYP	Defines pylon type = 1 elliptical

If NVTAIL = 1, use Data 33; otherwise, skip.

Data 33:

FORMAT (2A4, 1015)		(Subroutine DATA)
GG(2)	Remarks	
NX(KS)	Number of elements in × di	irection
NY(KS)	Number of elements in y di	irection
KVTELE	Defines the variation of ele 0 define by input 1 uniform element distril axial and spanwise dir 2 nonuniform (quadratic distribution along axid wise direction 3 quadratic along spanw with uniform element in axial direction 4 quadratic along axial with uniform element in spanwise direction	bution along rection) element al and span- rise direction distribution

KVTSHP

Defines vertical tail shape
= 1 circular biconvex airfoil

$$Z = \pm \left\{ \frac{\left[\left(\frac{c}{2}\right)^2 + \tau_{\text{max}}^2}{2 \tau_{\text{max}}}\right]^2 - \left[X - \frac{X_{\text{LE}} + X_{\text{TE}}}{2}\right]^2 - \left[\left(\frac{c}{2}\right)^2 - \tau_{\text{max}}^2}{2 \tau_{\text{max}}}\right]^{1/2} - \left[\left(\frac{c}{2}\right)^2 - \tau_{\text{max}}^2}{2 \tau_{\text{max}}}\right]^{1/2} \right\}$$

= 2 define by following equation

$$Z = \pm \sqrt[7]{\sqrt{\left(\frac{X}{X_{TE} - X_{LE}}\right)}}$$

$$\left(1 - \frac{X}{X_{TE} - X_{LE}}\right)$$

$$\sqrt{1 - \frac{Y}{S}}$$

= 3 define by following equation

$$Z = \pm (4 \tau) (2 C_0) \left\{ \left(\frac{X}{X_{TE} - X_{LE}} \right) \right\}$$

$$\left(1 - \frac{X}{X_{TE} - X_{LE}} \right) \sqrt{1 - \frac{y}{s}} \right\}$$

Table 4. Input Description (Continued).

KVTSHP (Cont.)	where	
		c = chord length
		X _{LE} = x components of sectional leading edge
		X _{TE} = x components of sectional trailing edge
		y = spanwise location of the section
		S = half span
		- /3 (-)

 $\bar{\tau} = \tau_{\text{max}} \left(\frac{3}{4} \sqrt{3} \right) (2 C_0)$

 $C_0 = root chord$

KVΠΥΡ Define vertical tail type
= 1

If NSHAFT = 1, use Data 34; otherwise, skip.

Data 34:	FORMAT (2A4, 1015)	(Subroutine DATA)
	GG(2)	Remarks
	NX(KS)	Number of elements in shaft direction
	NY(KS)	Number of elements in circum- ferential direction
	KSHELE	Defines the variation of element size = 0 define by input = 1 uniform element distribution
	KSHSHP	Defines rotor shaft shape = 1 cylindrical
	KSHTYP	Defines rotor shaft type = 1 circular cross section

Table 4. Input Description (Continued).

If NHUB = 1, use Data 35; otherwise, skip.

Data 35: FORMAT (2A4, 1015)

(Subroutine DATA)

GG(2) Remarks

NX(KS) Number of elements in x direction

NY(KS) Number of elements in circumferential

direction

KHBELE Defines the variation of element size

= 0 define by input

= 1 uniform element distribution

KHBSHP Defines rotor hub shape

= 1 elliptical

KHBTYP Defines rotor hub type

= 1 elliptical

If NSHANK = 1, use Data 36; otherwise, skip.

Data 36: FORMAT (2A4, 1015)

(Subroutine DATA)

GG(2)Remarks

> Number of elements in shank direction NX(KS)

> Number of elements in circumferential NY(KS)

direction

KSKELE Defines the variation of element size

0 define by input1 uniform element distribution

KSKSHP Defines blade shank shape

= 1 cylindrical

Defines blade shank type KSK TYP

= 1 circular cross section

If NBLADE = 1, use Data 37; otherwise, skip.

Data 37: FORMAT (2A4, 1015)

(Subroutine DATA)

GG(2)

Remarks

NX(KS)

Number of elements in x direction

Table 4. Input Description (Continued).

NY(KS)

Number of elements in y direction

KBLELE

Defines the variation of element size

= 0 define by input

= 1 uniform element distribution

 2 nonuniform (quadratic) element distribution

KBLSHP

Defines rotor blade shape

= 1 circular biconvex airfoil

$$Z = \pm \left\{ \frac{\left[\frac{c}{2} \right]^2 + \tau_{\text{max}}^2}{2 \tau_{\text{max}}} \right]^2 - \left[X - \frac{X_{\text{LE}} + X_{\text{TE}}}{2} \right]^2$$
$$- \frac{\left(\frac{c}{2} \right)^2 - \tau_{\text{max}}^2}{2 \tau_{\text{max}}} \right\}^{1/2}$$

= 2 define by following equation

$$Z = \pm \overline{\tau} \left\{ \sqrt{\left(\frac{X}{X_{TE} - X_{LE}}\right)} \left(1 - \frac{X}{X_{TE} - X_{LE}}\right) \sqrt{1 - \frac{r}{R}} \right\}$$

= 3 define by following equation

$$Z = \pm (4\tau) (2 C_o) \left\{ \left(\frac{X}{X_{TE} - X_{LE}} \right) \right\}$$

$$\left(1 - \frac{X}{X_{TE} - X_{LE}} \right) \sqrt{1 - \frac{r}{R}} \right\}$$

KBLSHP (Cont.)

where

c = blade chord

X_{LE} = x components of blade leading edge

redding eage

X_{TE} = x components of blade trailing edge

r = radial location

R = rotor radius

 $\bar{\tau} = \tau_{\text{max}} \left(\frac{3}{4} \sqrt{3} \right) (2 C_0)$

C = blade root chord

KBLTYP

Defines rotor blade type

If NPYLON = 1, use Data 38-39; otherwise, skip.

Data 38: FORMAT (10F8.3)

(Subroutine COODPT)

HCSI(IX)

Normalized x direction nodal line coordinates [Note that HCSI(IX), IX = 1, NXP is implied with NXP denoting the number of nodal lines along the x direction]

Data 39: FORMAT (10F8.3)

(Subroutine COODPT)

HETA(IY)

Normalized y direction nodal line coordinates [Note that HETA(IY), = 1, NYP is implied with NYP denoting the number of nodal lines along the y direction]

If NVTAIL = 1, use Data 40-41; otherwise, skip.

Data 40: FORMAT (10F8.3)

(Subroutine COODPT)

HCSI(IX)

Normalized x direction nodal line coordinates [Note that HCSI(IX), IX = 1, NXP is implied with NXP denoting the number of nodal lines along the x direction]

Data 41: FORMAT (10F8.3)

(Subroutine COODPT)

HETA(IY)

Normalized y direction nodal line coordinates [Note that HETA(IY), IY = 1, NYP is implied with NYP denoting the number of nodal lines along the y direction]

If NSHAFT = 1, use Data 42-43; otherwise, skip.

Data 42: FORMAT (10F8.3)

(Subroutine COODPT)

HCSI(IX)

Normalized x direction nodal line coordinates [Note that HCSI(IX), IX = 1, NXP is implied with NXP denoting the number of nodal lines along the x direction]

Data 43: FORMAT (10F8.3)

(Subroutine COODPT)

HETA(IY)

Normalized y direction nodal line coordinates [Note that HETA(IY), IY = 1, NYP is implied with NYP denoting the number of nodal lines along the y direction]

If NHUB = 1, use Data 44-45; otherwise, skip.

Data 44: FORMAT (10F8.3)

(Subroutine COODPT)

HCSI(IX)

Normalized x direction nodal line coordinates [Note that HCSI(IX), IX = 1, NXP is implied with NXP denoting the number of nodal lines along the x direction]

Data 45: FORMAT (10F8.3)

(Subroutine COODPT)

HETA(IY)

Normalized y direction nodal line coordinates [Note that HETA(IY), IY = 1, NYP is implied with NYP denoting the number of nodal lines along the y direction]

If NSHANK = 1, use Data 46-47; otherwise, skip.

Data 46: FORMAT (10F8.3)

(Subroutine COODPT)

HCSI(IX)

Normalized x direction nodal line coordinates [Note that HCSI(IX), IX = 1, NXP is implied with NXP denoting the number of nodal lines along the x direction]

Data 47: FORMAT (10F8.3)

(Subroutine COODPT)

HETA(IY)

Normalized y direction nodal line coordinates [Note that HETA(IY), IY = 1, NYP is implied with NYP denoting the number of nodal lines along the y direction]

If NBLADE = 1, use Data 48-49; otherwise, skip.

Data 48: FORMAT (10F8.3)

(Subroutine COODPT)

HCSI(IX)

Normalized x direction nodal line coordinates [Note that HCSI(IX), IX = 1, NXP is implied with NXP denoting the number of nodal lines along the x direction]

Data 49: FORMAT (10F8.3)

(Subroutine COODPT)

HETA(IY)

Normalized y direction nodal line coordinates [Note that HETA(IY), IY = 1, NYP is implied with NYP denoting the number of nodal lines along the y direction]

If KREAD = 1, use Data 50; otherwise, skip.

Data 50: FORMAT (3E12.4)

(Subroutine COODPT)

XK(K, INODE)

The nodal coordinates in global Cartesian system [Note that (XK(K,INODE), K = 1,3), INODE = 1, NNODE) is implied]

If NWAKPY = 1 and NSTAG = 1, use Data 51-54; otherwise, skip.

Data 51: FORMAT (3E12.4)

YPP(K)

Data 52: FORMAT (3E12.4)

YPM(K)

Data 53: FORMAT (3E12.4)

YMP(K)

Data 54: FORMAT (3E12.4)

YMM(K)

(Subroutine COODPT)

The separation wake nodal coordinates in global Cartesian system [Note that K=1,3 is implied]

If NWAKPY = 1 and NVORT = 1, use Data 55-58; otherwise, skip.

Data 55: FORMAT (3E12.4)

YPP(K)

Data 56: FORMAT (3E12.4)

YPM(K)

Data 57: FORMAT (3E12.4)

YMP(K)

Data 58: FORMAT (3E12.4)

YMM(K)

(Subroutine COEFF)

The isolated vortex branch wake nodal coordinates in global Cartesian system [Note that K=1,3 is implied]

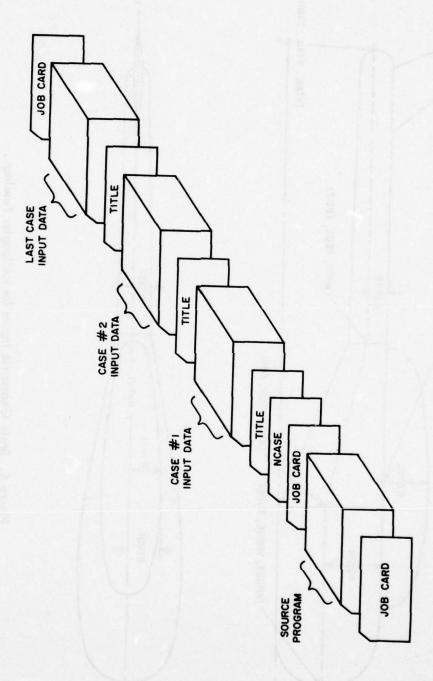


Figure 5. Program SHAPES Data Setup.

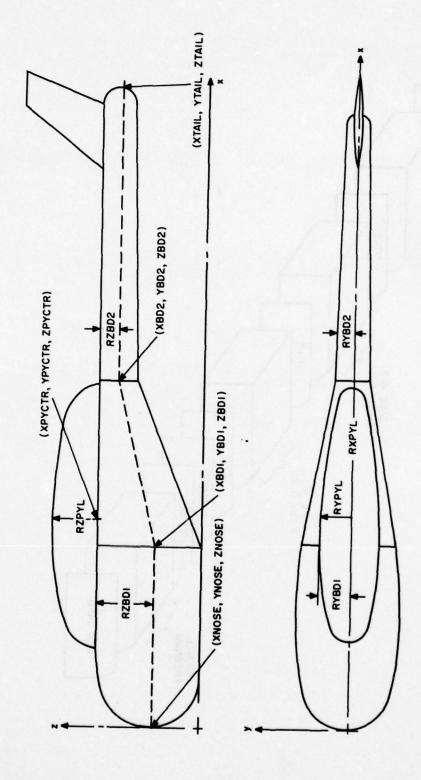


Figure 6. Basic Geometric Inputs for Helicopter Fuseluge.

4.2 ERROR CODES

To insure proper data are read in and to minimize unnecessary computer time, SHAPES contains several debugging statements at specified checkpoints. If an inconsistency among input data or violation of the input specification is detected, an error code will be printed and the computer run terminated. Table 5 summarizes these error codes.

Table 5. Error Codes Summary.

Code Number	Description
100	Mach number is greater than 1 (Present SOUSSA is a subsonic program) (DATA)
200	NS ≠ (NPYLON + NVTAIL)*MULTY + (NBODY1 + NBODY2 + (NBODY3)*MULT*MULTY + (NSHAFT*MULTY + (NHUB*MULT*MULTY* + KBLADE*(NSHANK + NBLADE*MULT) (DATA)
300	Number of elements in the x direction of a subsurface exceeds the maximum permissible value. This is limited by the storage capacity of the computer. The user has the option of changing the value of NXMAX and NYMAX defined in the main program. (DATA)
400	Same as code number 300 except for the y direction. (DATA)
500	Total number of elements required for analysis exceeds the maximum limit specified in the main program. (DATA)
IER	IBM subroutine GELG provides error code = 0 no error = 1 no result is obtained because the number of equations is less than 1 or the pivoting element at any elimination step equals 0 = N warning is indicated because of a possible loss of significant figures at elimination step N+1 where the pivoting element is less than equal to the specified tolerance times the magnitude of the greatest element of matrix A (DATA)

SECTION 5

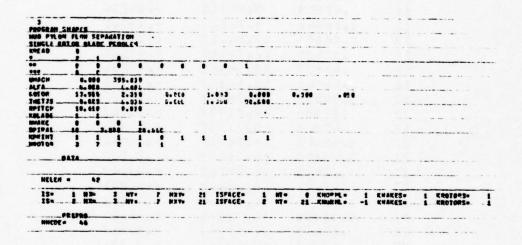
PROGRAM OUTPUT

In Program SHAPES several output options are available and these are briefly summarized here. The amount of output required to be printed out is controlled by Data 28, described in Subsection 4.1. Among the information available is the specification of the problem defined by the user and the basic geometric inputs to the problem, i.e., overall dimensions and shapes used to model a helicopter configuration. In addition, the nodal numbering of the aerodynamic breakup as well as the Cartesian coordinate location of the nodal points and the centroid of each aerodynamic panel can be requested. Furthermore, the coefficient matrix and source distribution can be output. Also, the perturbation potential, velocity, and the pressure coefficient are available as outputs. Finally, the lift and induced drag can be requested.

SECTION 6 PROGRAM LISTING

SAMPLE CASE 1: SINGLE-BLADE ROTOR

Data Input



Specifications of the Problem

THIS PAGE IS BEST QUALITY PRACTICABLE
FROM COPY FURNISHED TO DDC

X, Y, and Z Coordinates of the Nodes

HODE=	x	1141200	Z
	0.0000	2 7 70 . 0	
1 2	0.00000 - 12025	2.33000	0.00000 61163
3	.47 60 3	2.33000	06234
4	1.06448	2.33000	19941
5	0.00000	6.35+69	0.00000
· · · · · · · · · · · · · · · · · · ·	.12625	6.35+69	01163
7	.47803	6.35+69	06234
8	1.06448	6.35469	19941
ç	0.00000	9.76120	0.00000
10	.12625	9.76126 -	01163
11	.47803	9.76320	06234
12	1.06448	9.76323	19941
13	0.00000	12.54553	0.00000
14	- 12625	12.54553	61163
15	•47803	12.54553	06234
16	1-66448	12.54553	19941
17	0.00000	14.71367	0.00008
18	•12025 •47803	14.71367	01163
20	1.06448	14.71367	06234
21	0.60000	16.26163	19941
22	.12025	16.26163	01163
23	.47803	16.26163	96234
24	1.66446	16.26163	19941
25	0.00000	17.19341	0.00000
28	-12025	17.19341	01163
27	.47863	17.19341	06234
- 26	1.66 448	17.19.41	19941
20	C.00000	17.50000	0.00000
30	•11028	17.50000-	42216
31	• 47 31 9	17.50000	6862
32	1.06446	17.50)00	19941
34	.46810	2.33100	03269 11491
35	.11630	6.35+69	03269
3€	.46818	6.35+69	11491
37	.11630	9.76320	03269
38	-46818	9.76726	11491
39	.11636	12.54553	03269
40	.46010	12.54553	11491
41	.11630	14.71367	03269
42	6818	14.71367	11491
43	•11630	16.26163	03269
-44	-46818	16.26163	11491
45	.11 63 0	17.19341	03269
46		17.193-1	11491

X, Y, and Z Coordinates of the Centroid of Aerodynamic Panels

ELEM=	XPC	YPC	ZPC
1	.06012	4.34235	00561
2	.29914	4.34235	03698
. 3	.77126	4.34235	13087
4	.06012	8.05745	00561
5	.23914	8-05745	03698
6	.77126	8.05745	13087
7	.00012	11-15337	00581
8	.29914	11.15337	03698
9	.77126	11.15337	13687
10	.06 . 12	13.63010	00581
11	.29914	13.63013	03698
12	.77126	13.63010	13(87
13	.06012	15.48765	00581
14	.29914	15.48765	03698
15	.7712€	15.48705	13087
16	.08012	16.726:2	00581
17	.29914	16.72632	03698
18	.77126	16.72612	13687
19	.059e3	17.34520	00845
26	.297L1	17.34525	04619
21	.77003	17.34520	1 3744
22	. 45815	4.34235	01634
23	. 29224	4.34235	07380
24	.76633	4.34235	15716
25	.05815	8.05745	01634
26	. 29224	8.05745	07380
27	.76633	8.05745	15716
28	.05815	11.15337	01634
29	.29224	11.15357	0.7380
30	.76633	11.15337	15716
31	.05815	13.63010	01634
32	.29224	13.63010	07381
33	. 76633	13.63010	15716
34	.05815	15.48765	61634
35	. 29224	15.48765	07380
36	.76633	15.48765	15716
37	.65815	16.72602	01634
38	.29224	16.72602	07380
39	.76633	16.72602	15716
40	.05864	17.34520	31371
41	.29397	17.34520	6 6459
42	.7675E	17.34520	15059

Nodal Numbering for Surfaces

1	5_	9	13	17	-21	25	20
2	6	16	14	18	22	26	3
3		-11	15	19	_23	- 27	
4	8	12	16	20	24	28	3
FOR	SURFA	CE	25				
1	5	9	13	17	21	25	2
33_	35	_ 37	39	61	-43		3!
34	3€	38	+0	42	44	46	3
4	8-	- 12-	_ 16 -	26	24	- 28	3

Nodal Numbering for Elements

ELEM	++	t		
	- 6	_ 2	5	1
2	7	- 1	6	2
	- 4			3
4	15	6	3	5
5-	11		12	6
6	12	8	11	7
8	14	-16	13	- 9
9	15	11	14 - 15 17	13
10	1.8	14	- 15	11
	19		- 18	13
12	18 19	16	10	15
-13-	22	16	19	- 17.
14	23 24	19	22	18
15	-24	20	-23	18
16	26	19 20 22 	25	21
17	27	23	22 23 25 26 27 29 30	-22
18	28	24	27	23
55	36	- 26	29	
- 21	31	27	20	26
22 23	33	35	1	-27
23	34	3E		35
24	4	8	?3 34	36
25	35	37	_ 5	9
24 25 26	36	38	35	37
27	-	12		38
28	37	39	9	13
	38_	-63		_39_
30	12	16	38	40
32	46	42	38 13 39	_17_
	-16	20	40	41
34	41	43	17	-42-
35	42	-13	-1	21
36	20	24	+2	44
37	-43	. 45	21_	25.
36	44	46	43	45
39	-24-	28	4	45
4.	45	33	25	25 -30: 31
-41		-31-	_45	-30:
42	6.5	32	-6	31

The Distribution of the Source

THIS PAGE IS BEST QUALITY PRACTICABLE
FROM COPY FURNISHED TO DDC

FOR SUBSUEFACE						
		13-116-62	114716+61	18312:+92		105100+02
27443E0u1	**********	T.W407E+61	77902E+01	67434E+01	- =. 88877E#1	5371SE+81
.40619[+51	.911321+61	.12643E+12	.15+65E+82	.17488:+02	.17995E+82	.93205E+01
FOR SUBSURFACE	28					
6.6868+61			-,162476+62			
-,46465 [181			16336E+82			
.334646483		.472862+61	.11 6396+02	.11954:+02	.12013E+02	.61446.01

The Distribution of the Velocity Potential

FLE .SUBSINEACE						
.47/43E+62	.120761+63	. 13220 t++ 3	*1318 tE+L3	. 12223 - +(3	.16425E+03	.94556[+6
.11366661		.157396+63	.101436483		.13902E+03	
	.152961.03			.1756(2+63	.159F3E+L3	.125166+0
FOR SURSURFACE	25					
. EG 347 E+42		*23475465	.412746468		. 162636 +52	
.490321042		. 395316+02	.231276.02	34100:+01	-, 6230 0E +01-	
.46.931.02	. 42059: +32	. 20 27 36+42	.120526-62	7057 2:0(1	13457E+LE	.618216+8

Pressure Distribution

OF SUBSUFFAC	E 241					
.89036666				-,240254441	2865E444-	
.12654 (+44	195351+88	202346+00	360656+09	-,411526+00	385-96+88	212156+00
.225336+06	-35274[+0.0-	.511066.00	65887E+48		.697176+88 -	
IN SUBSURFAC	€ 25					
. 42564 £+88	-187562+01-		.23371E+41	2664 3E++1	.25+63E+41	
. 81 6574-(1	.132261 +L 6	.197536+16	.253376+00	. 27727: • 00	.24446.+00	.07001E-01

PAGE IS BEST QUALITY PRACTICABLE COPY FURNISHED TO DDC

SAMPLE CASE 2: XH-51A HELICOPTER ROTOR

Data Input

FOUR BLAD	FLOW SEPA												
KREAD													
•		•											
•••						1						-	
	1:11	356. [27											
unace Alfa	4. 000	0. 100											
BOTOR -	17.586	7.334	1. 111			1.50							
THETTS	1.000	1.111	1.000							•			
RPITCH	10.310	7.605					****** ***			-			
KOLAGE	• 1												
HUARE	-11-	1-	*****	-									
SPIRAL	10 3.	eee 34.											
SPIRAL RPRINT WROTOR	1 1	7 1	1	1	- 1		1						
RPRINT	1 1	7 1	' '	1	1	1	1						
RPRINT WROTOR	1 1	11	' '	1	- 1	•	•						
RPRINT WROTOR	1 1 ATA	1.1											
EPRINT HROTOR O HELEH	ATA	1.1											
EPRINT HROTOR O HELEH	ATA	3 1 1	9 ARY		ISTACE		ui.	-:	CHPONIL -	_;	RHARESO		* KROTCR 50
RPRINT HROTOR O HELEH	ATA	1.1		25	SFACE		ure ure ure		KHOGHL -	-1			KROTCRS-
RPRINT HROTOR HELEH 15- 15-	1 1 1 ATA	3 NY:	9 Apyo 5 Apyo 9 Apyo	53	ISFACE	: :	WT -	50		-	RWARES-		
RPRINT HROTOR O HELEH	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	3 NY:	5 WAA-	25	SFACE		HT -		KHORML -	1	KWAKES-		KROTCRS-
RPRINT HROTOR O HELEH 15- 15- 15-	200 1 HX 2 HX- 2 HX- 3 HX- 4 HX-	\$ NY- \$ NY- \$ NY-	9 Axye 5 Axye 9 Axye 9 Axye 9 Axye	53 53	ISFACE ISFACE		NT -	79	KHORML - KHORML -	1	KM4 KES- KM4 KES- KM4 KES-		KROTCRS= KROTCRS= KROTCRS=
MELEN 15- 15- 15- 15-	# 200 # 100 #	\$ NY- \$ NY- \$ NY- \$ NY-	9 MXY- 9 MXY- 9 MXY- 9 MXY-	25	ISPACE ISPACE ISPACE		NT - NT -	75 100	KHOPPL = KHOPPL = KHOPPL = KHOPPL = KHOPPL =	-1	### #£3- ### #£3- ### #£3- ### #£3-		KROTCRS- KROTCRS- KROTCRS- KROTCRS- KROTCRS-
RPRINT WROTOR O WELEW IS- IS- IS- IS- IS- IS- IS-	9 9 ATA - 200 - HXU	\$ 870 \$ 870 \$ 870 \$ 870 \$ 870 \$ 870	9 MXY- 9 MX- 9 MX- 9 MX- 9 MX- 9 MX- 9 MX- 9 MX-	25	ISPACE ISPACE ISPACE ISPACE		NT - NT - NT - NT -	79 100 125	KHORML = KHORML = KHORML = KHORML =	-1	KW4 KES- KW4 KES- KW4 KES- KW4 KES-		KROTCRS- KROTCRS- KROTCRS- KROTCRS- KROTCRS-

THIS PAGE IS BEST QUALITY PRACTICABLE FROM COPY FURNISHED TO DD.C

Specifications of the Problem

FOR FART 24 NX= 5 NY= 5

FOR PART 25 NX= 5 NY= 5

FOR PART 27 NX= 5 NY= !

FCR FART 28 NX= F NY= f

FOR FART 30 NX= 5 NY= 5

FOR FART 31 NX= 5 NY= E

FOR FART 33 NX= 5 NY= 5

FOR FART 34 NX= 5 NY= 5

NELEM=200

KSYMMY= 0 KSYMMZ= 0

X, Y, and Z Coordinates of the Nodes

NOCE=	x	*	Z
	0.00000	2.33000	0.00000
ž	.04335	2.33000	00388
3	.17300	2.33000	01758
4	.38791	2.33000	(4726
6	1.06448	2.33000	10309
	0.00000	7.79120	0.00000
8	.04335	7.79120	00388
10	.17300	7.79120	01758 04726
	.68587	7.79120	10309
12	1.06443	7.79120	19941
13	2.00000	12.13830	0.06633
14	.04335	12.03880	00388
16	.38781	12.03880	04726
17	.68587	12.03880	10309
18	1.06448	12.03880	19941
20	.04 335	15.07280	00388
- 51	.17300	15.07280	01798
22	.38781	15.07280	04726
23	1.06448	15.07280	10309
- 25	0.00000	16.89320	0.00000
26	.04335	16.89320	00388
27	.17300	15.89320	01758
20	.68587	16.89320	04726
30	1.05448	16.89320	19941
31	0.00000	17.50000	0.00000
32	.17032	17.50000	00798
34	.38321	17.50000	07179
35	.68127	17.50000	12762
36	1.06448	17.50000	19941
37	.16753	2.33000	04623
39	.37 862	2.33000	09632
40	.67667	2.33000	15215
41	.16763	7.79120	01207
43	.37 662	7.79120	09632
44	.67667	7.79120	15215
45	.16763	12.03880	01207
46	.37862	12.03880	09632
48	.67667	12.03880	15715
	.04181	15.07280	01207
50	.15763	15.07280	04623
52	.67667	15.07280	15215
53	.04181	16.89320	01207
- 55	.16763	16.39320	04623
56	.67667	16.89320	09632
57	-2.33000	.00000	0.00000
58	-2.33000	.04335	00388
60	-2.33000	.17355	01758 04726
- 61	-2.33000	.68557	10309
62	-2.33000	1.06448	19941
64	-7.79129	.00300	00388
	-7.79120 -7.79120	.17300	01758
66	-7.79120	.38781	04726

- 67	-7.79120	.68587	10309
68	-7.79120	1.06448	19941
69	-12.03850	.00000	0.00000
70	-12.03880	.04335	00368
71 72	-12.03880	.38781	04726
73	-12.03880	.68567	10309
74	-12.03880	1.06448	19941
75	-15.07250	.00000	0.00000
76	-15.07280	.04335	00388
77	-15.07280	.17300	C1758 04726
79	-15.07280	.68587	10309
80	-15.07250	1.05448	19941
81	-16.89320	.00000	0.00000
62	-16.89320	.04335	00368
83	-16.89320 -16.89320	.17300	0175 E 0472 E
	-16.89320	.68557	10309
86	-15.89321	1.06448	19941
87	-17.50000	.00000	0.00000
88	-17.50000	.04258	00798
90	-17.50003	.38321	(3190
91	-17.50000 -17.50000	.38127	12762
92	-17.50000	1.06446	19941
93	-2.33000	.04131	01207
94	-2.33000	.16763	04623
95	-2.33033	.67667	09632
97	-7.79120	.04181	01207
Ç8	-7.79120	.16763	04623
99	-7.79123	.37832	09632
100	-7.79120	. 57657	15215
101	-12.03880	.04181	01207
102	-12.03880	.16763	09632
1(4	-12.03880	.67667	15215
105	-15.07280	.04181	01207
106	-15.07280	.16763	04 623
107	-15.07230	.37862	09632
109	-15.07280 -16.89320	.57567	01207
1 10	-16.89320	.16763	04623
111	-16.89320	.37862	09632
112	-16.89320	.67667	15215
113	04 335	-2.33000	00388
115	17300	-2.33000	01758
116	38781	-2.33000	04726
117	68587	-2.33000	10309
118	-1.06448	-2.33000	19941
119	00000	-7.79120 -7.79120	00368
121	17300	-7.79120 -7.79120	01758
1 22	38781	-7.79120	64726
153	68587	-7.79120	10309
124	-1.06448	-7.79120	19941
125	04335	-12.03580	00388
-127	17300	-12.03330	
128	33761	-12.03380	04726
129	68587	-12:03580	10309
130	-1.06448	-12.03880	19941
131	04335	-19.07230	9.00000 00388
132	17300	-15.07280	01758
134	38781	-15.07280	04726
135	63587	-15.07280	10309
136	-1.06448	-15.37280	19941
137	00 000	-15.89320	00388
128	04335	-16.89320	01752
140	38781	-16.59320	04726
	75.0		

141	68587	-13.39320	10309
142	-1.06448	-16.89320	19941
143	00000	-17.50000	0.00000
144	04253	-17.50000	00798
145	17032	-17.30300	03190
146	38321	-17.50000	07179
147	68127	-17.50000	127E2
148	-1.06448	-17.50000	19941
149	04181	-2.33000	01207
150	16763	-2.33000	64623
151	37862	-2.33000	09632
152	67667	-2.33000	15215
153	04181	-7.79120	01207
154	16763	-7.79120	04 623
155	37862	-7.79120	09632
156	67667	-7.79120	15215
157	04181	-12.03880	01207
158	16763	-12.03880	04623
159	37862	-12.03880	09632
160	67667	-12.03880	15215
161	04181	-15.07230	01207
162	16763	-15.07280	04623
163	37862	-13.37280	09632
164	67667	-15.07280	15215
115	04181	-16.89320	01207
166	16763	-15.89320	04623
167			
	37862	-16.89320	09632
168	67667	-15.89320	15215
169	2.33000	00000	0.00000
170	2.33000	04335	00388
171	2.33000	17300	01758
172	2.33000	38791	04726
173	2.33000	66567	10309
174	2.33000	-1.06448	19941
175	7.79120	00000	0.00000
176	7.79120	04335	00388
177	7.79123	17300	(1758
178	7.79120	36761	C472E
179	7.79120	68587	10309
100	7.79120	-1.05448	19941
181	12.03890	03000	0.00000
162	12.03680	04335	00388
183	12.03880	17300	01758
1 84	12.33880	38781	0472E
185	12.03880	68587	10309
1 66	12.33880	-1.06448	19941
107	15.07280	00000	0.00000
188	15.07250	04335	00388
	15.07280	17300	01758
190	15.37283	38781	[4726
191	15.07280	68587	10309
192	15.07280	-1.06448	19941
193	18.89320	30000	0.00000
194	16.89320	04335	00388
195	18.89321	17300	01758
196	16.89320	38761	04726
197	16.89320	68537	10309
	******	100001	
	16.80 224		19941
198	16.89320	-1.06448	19941
198	17.53000	-1.06448 0000	0.00000
198 199 200	17.50000	-1.06448 0000 04258	00798
198 199 200 211	17.50000 17.50000	-1.06448 00000 04258 17032	00798 03190
198 199 200 211 202	17.50000 17.50000 17.50000	-1.06448 00000 04258 17032 38321	00798 03190 07179
198 199 200 211 202 203	17.50000 17.50000 17.50000 17.50000	-1.06448 00000 04258 17032 38321 68127	0.00000 00798 03190 07179
198 199 200 211 202 203 204	17.53000 17.50000 17.50000 17.50000 17.50000	-1.06448 00000 04258 17032 38321 68127 -1.06448	00798 03190 07179 12762 19941
198 199 200 211 202 203 204	17.50000 17.50000 17.50000 17.50000 17.50000 2.33000	-1.06448 00000 04258 17032 38321 68127 -1.06448 04181	00796 0796 03190 07179 12762 19941
198 199 200 211 202 203 204 209 206	17.50000 17.50000 17.50000 17.50000 17.50000 2.23000 2.23000	-1.06448 00000 04258 17032 38321 68127 -1.06468 04181 16763	0.00000 00792 03190 07175 12762 19941 01207 04 623
198 199 200 211 202 203 204	17.5000 17.5000 17.5000 17.5000 17.5000 17.5000 2.3300 2.3300	-1.06448 00000 04258 17032 38321 68127 -1.06448 04181 16763 37862	00796 00796 03190 07179 12782 19941 01207 04 623 09632
198 199 200 211 202 203 204 209 206	17.50000 17.50000 17.50000 17.50000 17.50000 2.23000 2.23000	-1.06448 00000 04258 17032 38321 68127 -1.06468 04181 16763	0.00000 00792 03190 07175 12762 19941 01207 04 623
198 199 200 211 202 203 204 209 206 207	17.5000 17.5000 17.5000 17.5000 17.5000 17.5000 2.3300 2.3300	-1.06448 00000 04258 17032 38321 68127 -1.06448 04181 16763 37862	00796 00796 03190 07179 12782 19941 01207 04 623 09632
198 199 200 211 202 203 204 209 206 207 208	17.5000 17.5000 17.5000 17.5000 17.5000 2.3300 2.3300 2.3300	-1.06448 -00000 -04258 -17032 -38321 -88127 -1.08488 -04181 -16763 -37862 -37567	0.00000 00798 03190 07175 12762 19941 01207 04 623 09632 15215
198 199 200 211 202 203 204 205 206 207 208 208	17.5000 17.5000 17.5000 17.5000 17.5000 17.5000 2.3300 2.3300 2.3300 2.3300	-1.06448 -00000 -04258 -17032 -38321 -68127 -1.08448 -04181 -16763 -37662 -67567 -04181	0.00000 00790 07175 12762 19941 01207 04 623 09632 15215
198 199 200 201 202 203 204 205 206 207 208 208 209 210	17.5000 17.5000 17.5000 17.5000 17.5000 2.3300 2.3300 2.3300 2.3300 2.3700 7.79120	-1.06448 -00000 -04258 -17032 -38321 -108448 -04181 -16763 -37862 -87567 -34181 -16763	0.00000 00792 03190 07175 12782 19941 01207 04 623 09632 15215 01207 04 623
198 199 200 211 202 203 204 209 206 207 208 208 210	17.5000 17.5000 17.5000 17.5000 17.5000 2.3300 2.3300 2.3300 2.3300 7.79120	-1.06448 -00000 -04258 -17032 -38321 -88127 -1.08448 -04181 -16763 -37862 -37867 -10763	0.0000 00798 03190 07175 12762 19941 01207 04.623 096.32 15215 01.207 04.623
198 199 200 211 202 203 204 209 206 207 210 211 212	17.5000 17.5000 17.5000 17.5000 17.5000 2.3300 2.3300 2.3300 7.79120 7.79120	-1.06448 -00000 -04258 -17032 -38321 -68127 -1.08448 -16763 -37862 -87567 -84181 -16763 -37862 -67667	0.00000 00790 007190 07175 12762 19941 01207 04 623 09632 15215 01207 04 623 09632 15215

215	12.03880	37862	09632
2 35	12.03850	67667	15215
217	15.07280	04131	01207
218	15.07280	16753	04623
2 19	15.07280	37862	09632
220	15.07230	67667	15215
221	16.89320	04181	01207
222	16.89320	16753	04623
223	16.89320	37852	09532
224	16.69320	*.67667	15215

X, Y, and Z Coordinates of the Centroid of Aerodynamic Panels

ELEM=		Abc	ZPC
1	.02167	5.05060	00194
2	.10817	5.05050	01073
3	.28041	5.06060	03242
4	.53684	5.06060	075 17
5	.87517	5.06060	15125
	. 021E7	9.91500	00194
7	.10617	9.91500	01073
8	. 28041	9.91500	33242
9	. 53684	9.91500	075 17
10	. 87517	9.31500	15125
11	.02167	13.55580	00194
12	.10817	13.55580	01073
13	.28041	13.55580	3242
-14	-53684		075 17
		13.55580	- 454 25
15	.87517	13.55580	15125
18	.02167	15.98300	00194
17	.10817	15.98300	01073
18	.28041	15.98300	03545
19	.53684	15.98300	075 17
50	.87517	15.98300	19125
21	.02148	17.19660	00296
55	.10731	17.19660	01534
5.3	.27859	17.19660	04213
24	. 53454	17.19660	08744
25	. 87403	17.19650	15738
- 56	.02091	5.06060	0 06 04
27	.10472	5.06060	02915
28	.27313	5.06060	07127
29	.52765	5.06060	12423
- 30	.87058	5.06060	17578
31	. 62091	9.91500	0 06 64
32	.10472	9.91500	02915
33	.27313	9.91500	07127
34	. 52765	9.91500	12423
35	.87058	9.91500	17578
- 36	.02091	13.35587	03834
37	.10472	13.55580	0 29 15
38	.27313	13.55580	07127
39	.52765	13.55530	12423
40		13.5555	17578
41	.87158	15.98300	- 11310
	.02091	15.50300	00604
	.10472	15.98300	02915
43	. 27313	15.98300	07127
44	.52765	15.98330	12423
45	. 87058	15.98339	17578
46	.02110	17.19650	00501
47	.10559	17.19660	02455
48	. 27455	17.19650	06155
49	.52994	17.19660	11197
50	.87173	17.19650	16954
51	-5.06060	.02167	00194
52	-5.06060	.10817	01073
53	-5.05060	.28041	03242
- 54	-5.06760	*2368#	07517
55	-5.06060	.87517	15125
56	-9.91500	.02157	00194
57	-9.91500	.10817	01073
58	-9.91500	.28041	33242
59	-9.91500	.53684	07517
60	-9.91500	.87517	151 25
61 -	13.55580	.02167	00194
	13.55580	.10817	01073
63 -	13.5558C	.28341	03242
- 64 -	13.55580	.53686	07517
65 -	13.55580	.87517	15125
	15.98300	18150.	00194
	15.98300	.10817	01073
	19.98300	.28041	03242
	15.98300	.53684	07517
	15.98300	.87517	15125

71	-17.19660	.02148	00296
72	-17.19660	.10731	01534
73	-17.19660	.27859	04213
75	-17.19660	.53454	08744
75	-17.19660	.87403	15738
76	-5.06060	.13472	00604
78	-5.06060	.27313	07127
79	-5.06060	.32765	12423
80	-5.06060	.57058	17575
81	-9.91500	·J2691	06664
82	-9.91500	.10472	0 29 15
54-	-9.91500	.27313	07127
85	-9.91500	.87058	12423
86	-13.55580	16020	00604
87	-13.55580	.10472	02915
88	-13.55580	.27313	07127
99	-13.555é0	.52765	12423
91	-13.55580	.02091	17578
- 92	-15.98300	-10472	02915
93	-15.98300	.27313	07127
94	-15.98300	-52765	* . 12423
95	-15.94300	.87058	17578
96	-17.19660	.02113	0 05 01
98	-17.19660	·10559	02455
99	-17.19660	.52994	11197
100	-17.19660	.87173	16964
101	02167	-5.06060	00194
102	10517	-5.08080	01073
103	28041	-5.06060 -5.06050	03242
105	87517	-5.05060	151 25
105	02167	-9.91500	00194
107	10817	-9.91500	01073
108	28041	-9.91503	** 63242
109	53664	-9.91500	075 17
111	02167	-9.91500 -13.55580	15125
112		13.55580	01073
113		-13.55583	03242
114	53664	13.55580	07517
115		-13-55580	15125
116		15.98300	61073
118		15.98300	03242
119		-15.98300	075 17
120		19.98300	*** 3129
121		-17.19660	00296
122		-17-19669	01534
123	27859	-17.19660 -17.19660	04213
125		17.19663	1 57 38
126	02091	-5.06060	00604
127	-,10472	-5.06060	02915
128	27313	-5.06060	07127
129	52765	-5.06060 -5.06060	12423
131	02191	-9.91530	00604
132	10472	-9.91500	02915
133	27313	-9.91500	07127
134	52765	-9.91500	12423
135	87058	-9.91500 -13.55580	17578
136		13.35580	8 29 15
138		13.55580	07127
139	52765 -	13.55580	12423
140		13,55580	17578
141		-15.98300	0 06 04
143		15.98300	07127

```
-.52765 -15.98300
-.87058 -15.96300
-.02110 -17.19660
144
                                    -.12423
-.17578
-.00501
        -.10559 -17.19660
-.27495 -17.19660
-.52994 -17.19660
 147
                                    -. 02455
 148
                                    -.06156
 149
                                    -. 11197
 150
         -. 87173 -17.19660
                                     -. 15964
        5.06060
                      -.02167
 151
 152
                                    -.01073
 153
         5.00060
                       -.29041
154
         5. 36383
                      -. 33684
                                    -. 07517
         5.06060
                      -.3751/
                                    -. 151 25
156
         9.91500
                      -.02167
                                    -- 00194
 157
         9.91500
                       -.10817
                                    -.01073
158
        9.91500
                      -.28041
                                    -.03242
159
        9.91500
                      -.53684
                                    -. 075 17
 160
                      -.87517
                                    -. 15125
 161 13.55550
                      -.02167
                                    -.00194
162 13.55580
163 13.55560
164 13.55580
165 13.55580
166 15.96300
                      -.10817
-.28341
-.53684
                                    -.01073
                                    -. 03242
                      -.87517
                                    -.15125
                      -.02167
       15.98300
                                    -. 00194
                      -.10817
                                    -.01073
168 15.98300
169 15.98300
170 15.98300
169
                      -.25041
                                    -. 03242
                      -.53684
                                    -. 075 17
                                    -. 151 25
171 17.19660
172 17.19660
173 17.19660
                       -.02148
                                    -.00296
                      --10731
                                    -. 51534
                      -.27859
                                    -.04213
       17.19660
                      -. 53454
                                    -. 08744
175 17.19660
                      -.87403
                                    -. 157 38
        5.06060
176
                      -- 12091
177
                      -- 10472
                                    -.02915
        5.06060
179
                      -.52765
                                    -.12423
        9.91500
9.91500
                      -.02091
                                    -.07578
180
182
                      -- 10472
        9.91500
9.91500
9.91500
183
                      -.27313
                                    -.07127
184
                      -.52765
                                    -.12623
186
       13.55580
                      -.02091
                                    -. 0 05 04
187
                      -.10472
-.27313
-.52765
                                    -. 0 29 15
       13.55580
                                    -. 07127
139
     13.55500
                                    -. 12423
      13.55580
190
                      -. 47055
                                    -.17578
191
                      -.02091
                                    -.006 04
       15.98300
                                    -. 0 29 15
193 15.98300
194 15.98300
195 15.98300
                      -.27313
                                    -.07127
                                    -.12423
                      -. 37 058
                                    -.17578
-.005 CI
196
                      -.02110
      17.196E0
                      -.10559
-.27495
-.32994
197
                                    -.02455
198
                                    -.06156
       17.19560
17.19560
                                   -.11197
```

Nodal Numbering for Surfaces

FCR	SURFA	CE	24		
1	7	13	19	25	31
2	8	14	20	- 26	32
3	9	15.	21	27	33
-	10	16	55	28	34
5	11	17	23	29	35
- 6	12	18	54	30	36
FOR	SURF	CF	-25-		
	3011.				
	7	13	19	25	-31
37	41	45	49	53	32
38	42	46	50	55	33
39	43	47	51	58	35
6	12	18	24	30	36
FOR	SURF	ACE	27		
			••		
57	63	69	75	- 81	87
59	65	71	77	33	89
60	66	72	- 78	84	90-
61	67	73	79	85	91
62	68	74	80	36	92
			14.		
FOR	SURF	ACE	28		
57	- 63-	- 69	75	- 31	87
93	97	101	105	109	38
94	98	102	106	-110-	89
95	99	103	107	111	90
96	100	104	108	112	91
62	68	74	80	86	92
FCR	SURF	ACE	30		
113	119	125	131	137	143
113	120	128	132	138	144
115	121	127	133	139	145
116	122	128	134	140	146
117	123	129	135	141	147
118	124	130	138	105	198
FOR	SURF	ACE.	-31 -		
FUR	300		31		
113	119	125	131	137	143
149	153	157	151	165	144
150	154	158	162	165	146
151	155	159	163	158	197
118	124	130	136	142	148
FOR	SURF	ACE	33		
169	175	181	187	193	199
170	175	182	188	194	200
171	177	1 83	189	195	201
172		184	190	196	Sas
173	173		101	197	203
	179	185	191		
174		185	192	198	504
	179	186			
174 FOR	179 180 SURF	186	192 - 34	195	204
174 FOR	179 180 SURF	186 ACE 181	192 - 34 187	195	199
174 FOR 169 205	179 180 SURF 175 209	186 ACE 181 213	192 - 34 - 187 217	193	199
174 FGR 169 205 205	179 180 SURF 175 209 210	186 ACE 181 213 214	192 - 34 - 187 - 217 - 213	198 193 221 222	199
174 FGR 169 205 206 207	179 180 SURF 175 209 210 211	186 ACE 181 213 214 215	192 - 34 - 187 217 - 213 219	198 193 221 222 223	199
174 FGR 169 205 205	179 180 SURF 175 209 210	186 ACE 181 213 214	192 - 34 - 187 - 217 - 213	198 193 221 222	199

Nodal Numbering for Elements

ELEM	**	+-	-+	
1	â	2	7	1
3	10	4	9	3
	11	5	10	
6	12	- 5	11	- 7
7	15	9	14	8
9	15	11	15	10
-10-	18	12	17	11
11	20	14	19	13
13	22	16	21	15
15	23	18	23	16
16	26	20	25	19
17	27	21	- 26 27	20
19	29	23	28	22
20	30	26	31	25
- 55	33	27	35	26
23	34	28	33	27
25	36	30	35	29
26	37	42	1	41
28	38	43	37	42
29	40	44	39	43
31	41	12	7	13
33	42	46	- 41	45
- 34	43	47	42	46
35	12	13	44	46
36 37	46	53	13	19
38	- 67	51	46	50
- 40	48	52	47	51
41	49	53	19	25
43	50 51	54	50	53
	52	55	51	55
45	- 53	30	52	56
47	54	33	53	32
48	55	35	54	33
50	30	36	55	35
51	64	- 58	63	57
53	66	60	65	59
55	68	52	66	61
56	70	64	69	63
57	71	65	70	64
59	73	67	72	66
60	76	70	75	69
- 62	77	71	78	70
63	78	72	77	71
65	80	74	79	73
66	82	76	81	75 76
- 68	84	78	83	77

69 85 79 84 70 86 80 85 71 86 2 87 72 89 83 88 73 90 84 89 74 91 85 90	78 79 51 32 83
72 89 83 88 73 90 84 89 74 91 85 90	32
73 90 84 89 74 91 85 90	
74 91 85 90	83
75 92 86 91	35
76 93 97 57	63
77 94 98 93	97
78 95 99 94	98
79 96 100 95	99
80 62 68 96	130
81 97 101 63 82 98 102 97	69
83 99 103 98	102
84 100 104 99	103
85 68 74 100	104
36 101 105 59	75
67 102 106 101	105
88 103 107 102 89 104 198 103	106
89 104 108 103 90 74 80 104	107
91 105 109 75	61
92 106 110 105	109
93 107 111 106	110
94 108 112 107	111
95 80 86 108 96 109 88 81	87
97 110 89 109	88
98 111 90 110	89
99 112 91 111	90
100 86 92 112	31
101 120 114 119	113
102 121 115 120	115
104 123 117 122	116
105 124 118 123	117
106 126 120 125	119
107 127 121 126	120
105 128 122 127 109 129 123 126	121
110 130 124 129	122
111 132 126 131	125
112 133 127 132	125
113 134 128 133	127
114 135 129 136	128
115 136 130 135 116 138 132 137	129
117 139 133 138	132
118 140 134 139	133
119 141 135 140	134
120 142 136 141	135
121 144 138 143	1 37
122 145 139 144 123 146 140 145	138
124 147 141 146	140
125 148 142 147	141
126 149 153 113	119
127 150 154 149	153
128 151 155 130 129 152 156 151	155
129 152 156 151 130 118 124 152	156
131 153 157 119	125
132 154 158 153	137
133 155 159 154	158
134 156 160 155	159
135 124 130 156 136 157 161 125	150
137 158 162 157	161
138 159 163 158	162
139 160 164 159	163
140 130 136 180	164
141 161 165 131	137

142	162	166	161	165
1+3	163	167	162	166
144	154	158	153	167
145	136	142	16+	168
145	165	144	137	193
147	166	145	165	144
148	167	146	155	145
149	168	147	167	146
150	142	148	158	147
151	176	170	175	169
192	177	171	175	170
153	178	172	177	171
154	179	173	178	172
155	180	174	179	173
156	182	175	131	175
157	183	177	182	176
158	184	178	183	177
159	155	179	184	178
160	166	187	185	179
161	188	182	157	181
162	189	183	133	1 5 2
163	190	184	139	183
164	191	183	195	134
165	192	186	191	185
166	194	1881	193	187
167	195	189	194	188
168	106	190	195	139
169	197	191	196	190
170	190	1.92	197	191
171	200	194	199	193
172	201	195	200	194
173	202	196	231	195
174	203	197	535	1 46
176	205	198	503	197
177	205	219	205	175
178	207	211	205	209
179	208	212	207	211
130	174	180	208	212
181	209	213	175	181
182	210	214	209	213
183	211	215	210	214
184	212	215	211	215
185	180	186	212	216
186	213	217	181	187
187	214	218	213	217
188	215	219	214	218
189	216	220	215	219
190	186	192	216	220
191	217	221	137	193
192	218	222	-217	221
193	219	223	218	222
194	550	554	219	-553-
195	192	198	220	224
196	221	200	193	199
197	222	201	221	200
198	-223	512	222	2:1
199	224	203	223	202
200	198	204	224	203

The Distribution of the Source

FCR SUBSURFAC	E 241			
67898E+01	12965E+C2	17601E+02	20 237E+G2	11351E+02
64984E+01	1245 DE+D2	16917E+02	19516E+02	10964E+02
36705E+01	69826E+01	94992E+01	10879E+G2	62031E+01
.20676E+01	.40148E+01	.54635E+01	.63976E+01	.33652E+01
.76145E+01	-14806E+02	.20137E+02	. 23241E+C2	.127508+02
FOR SUBSURFAC	E 25			
70504E+01	13521E+02	18387E+02	21175E+02	11844E+02
75670E+01	14784E+02	20220E+02	23463E+02	13102E+02
59701E+01	11792E+02	16203E+UZ	18950E+02	15664E+02
85895E+00	20238E+01	29820E+01	37 337E+01	22639E+01
.60343E+01	.11586E+02	•15663E+02	. 17 933E+02	.98657E+01
FOR SUBSURFAC	E 27			
67898E+01	12965E+02	17601E+02	20237E+02	11351E+02
64984F+01	1245 0E+02	16917E+02	19516E+02	10964E+02
36705E+01	69626E+01	94592E+01	10879E+02	62031E+01
.20676E+01	.40146E+01	.54635E+01	. €3 976E+01	.33652E+01
.76:145E+01	.14806E+02	.20137E+02	.23241E+02	.12750E+02
FOR SUBSURFAC	E 28			
70504F+01	13521E+02	16387E+02	21179E+02	11844E+D2
75670E+01	14784E+02	20220E+02	23 463E+02	13102E+02
59701E+01	11792E+02	16203E+02	18950E+02	10664E+02
85895E+00	20238E+C1	2982üE+C1	37337E+01	22639E+01
.60343E+01	.11586E+02	*15663E+02	•17933E+02	.98657E+01

F.CR SUBSURFACE	30			
67898E+01	12965E+D2	17601E+02	20237E+02	11351E+02
6498+E+01	124505+02	16917E+02	19516E+02	10964E+02
36705E+01	69326E+01	94592E+01	10879E+02	62031E+01
.20676E+01	.40148E+01	.54635E+01	.63976E+01	.33652E+11
.76145E+01	.14806E+0Z	.20137E+02	. 23241E+02	•12750E+02
FOR SUBSURFACE	31			
70504E+01	135Z1E+02	18387E+02	21175E+02	11844E+DZ
75670E+01	147845+02	20220E+02	23463E+02	13102E+02
59701E+01	11732E+02	16203E+U2	18950E+02	10664E+02
858952+00	20238E+01	29820E+01	37 337E+01	226395+01
.60343F+01	.11586E+D2	.15663E+02	.17933E+02	.98657E+01
FOR SUBSURFACE	33			
67698E+01	129B5E+07	17601E+02	20237E+02	11351E+02
64 984E+01	12450E+02	16917E+02	1951 EE+02	10964E+02
367CSE+01	69826E+01	94592E+01	10879E+02	62031E+01
.20676F+01	.40148E+01	.54635E+01	. 63 9762+01	.33652E+01
.76145E+21	.148052+02	,20137E+02	. 23 2415+02	.12750E+02
FOR SUBSURFACE	34			
705N4E+01	13521E+02	-,18387E+02	21175E+02	118 44E+02
75670E+01	14784E+02	-,20220E+02	23463E+02	13102E+02
59701E+01	1179ZE+02	16203E+02	1895CE+02	10664E+32
85895E+00	20236E+01	29820E+01	37337E+01	22639E+01
.60343E+01	.11586E+02	.15663E+02	.17933E+02	.98657E+01

The Distribution of the Velocity Potential

FOR SUBSURFACE	24			
.176025+03	.206405+03	.2 (7325+03	.180685+03	.15468E+03
.17886E+03	.21339E+C3	.21796E+G3	.19379E+03	.16714E+03
.18380E+03	.22322E+03	.23153E+03	. 20 9615+03	.17963E+03
.18929E+03	.23356E+C3	.24566E+[3	.22568E+C3	.18934E+03
.18643E+03	.23073E+03	-24566E+03	. 222576+03	-18346E+03
FOR SUBSURFACE	25			
.16041E+03	.17883E+03	.17058E+03	.13619E+03	.11212E+03
.151836+03	.16619E+03	.15586E+03	.11874E+03	.95400E+02
•145F2E+03	.15728E+03	.14563E+03	.10694E+03	.82754E+02
.14360E+03	.15562E+03	.14404€+03	.10571E+03	.78885E+02
.14135E+03	.157562+03	.144515+03	.10988E+03	.82064E+02
FOR SUBSURFACE	27			
.17602E+03	.20540E+03	.207326+03	· 18 068E + 03	.15468E+03
.17866E+03	.21339E+03	.2 1798E+03	.19379E+03	.16714E+03
-18 360E+03	*552555+03	.231 53 E+03	.209615+03	.17963E+03
•18929E+03	.233565+03	.24566E+03	. 22568£+03	.18934E+03
-18843E+23	.23073E+03	.24565E+03	. 222575+03	.18346E+03
FOR SUBSURFACE	28			
*760#7£+83	.17883E+03	.17898E+03	.13819E+83	.112126+03
•15183E + 03	.16619E+03	.155862+03	.118746+03	.95400E+02
-1455ZE+03	.15728E+03	.14863E+03	.10694E+03	.82754E+02
.1-380E+03	.15562E+03	-14404E+03	.10571E+03	.78805E+02
•14135E+03	•15756E+E3	•14451E+U3	.10 988E +C3	.82 164 E+82

FOR SUBSURFACE	30			
.17602E+03	.2064E+03	.20732E+03	.180686+03	.15468E+03
.17886E+03	.21339£+03	.21798E+03	.19379E+03	. 167 14E+03
-18380E+03	.223225+03	.23153E+C3	.20961E+03	.17963E+23
.18929E+03	.23356E+03	.24566 E+03	.22568E+03	.18934E+03
.18643E+03	.23073E+03	.245662+03	.22257E+03	.18346E+03
FOR SUBSURFACE	31			
.16041E+03	.17883E+03	.17098E+D3	.136192+03	.11212E+03
.15183E+03	.16619E+D3	.15586E+03	.11874E+03	.954 00E+0
•14552E+03	.15728E+03	•14563E+03	.10694E+03	.82754E+02
.14360E+03	•15562E+03	•14404E+03	.10571E+03	.78885E+02
.14139E+03	.157565+03	.144515+05	•10988E+03	.82064E+02
FOR SURSURFACE	33			
.17602E+03	.20540E+03	.20732E+03	.180 68E+03	•15468 E+03
.17886E+03	,21339E+03	.21798E+03	. 19379E+03	.16714E+03
.18380E+03	.22322E+03	.23193E+03	.20961E+03	•17963E+01
.18929E+03	.233565+03	.24566E+03	. 22568E+03	.18934E+03
-18643E+03	.23073E+03	.24988E+03	.22297E+03	-18346E+03
FOR SUBSURFACE	34`		238.20	(X-9) 1-33
•16041E+03	.17883E+03	•17098E+03	.13619E+03	•11212E+03
.15183E+03	.16619E+03	.15586E+03	. 11874E+03	.95400E+02
.14552E+03	.15728E+03	.145635+03	.10694E+03	.82754E+02
-1438GE+03	.15562E+C3	.144045+03	.10571E+G3	.70085E+02
•14135E+03	.15758E+03	-14451E+03	-10 988E+03	.82064E+02

Pressure Distribution

FCR SUBSURFAC	E 24	CONTROL OF A SECRETARIAN SECTION ASSESSMENT OF A SECTION		10 44 14 17 14 14 15 14 16 16 16 16 16 16 16 16 16 16 16 16 16
10193E+01	185405+01	29055E+01	36 5536+61	18860E+0
15173E+00	30130E+00	48997E+00	E0 060E • 00	28944E+0
11633E+00	21550E+00	334755+00	38244E+00	21574E+01
24355E-01	81409E-01	10785E+00	10601E+00	65347E-0
.27068E+00	.45045E+00	.66623E+00	.79997E+00	.41744E+0
FOR SUBSURFAC	E 25			
.12332E+01	.20739E+01	.30870E+01	.38080E+01	.21446E+0
.242658+00	.37140E+00	.912215+00	. 61583E+00	.35977E+0
.77155E-01	.11078E+00	.14419E+00	.17862E+00	.82484E-0
.197566-01	.923685-02	29301E-02	11323E-01	102746-0
25524E+00	45014E+00	65576E+00	82446E+00	41975E+0
FOR SUBSURFAC	E 27			
22063E+0J	66035E+00	12827E+01	17903E+01	10721E+0
24219E-01	94388E-01	22385E+00	33037E+00	39245E+0
14865E-01	60488E-01	15311E+00	22746E+00	42499E+0
-694498-02	194582-02	51913E-01	99233E-01	39249E+0
.71613E-01	.17953E+00	.28145E+00	.32919E+00	22628E-0
FOR SUBSURFAC	æ_28			
.28237E+00	.75515E+00	.13274E+01	• 17 69 0E + 01	.10734E+0
.58637E-01	.13832E+00	.19970E+00	.24258E+0C	.29758E+0
.20845E-01	.40475E-01	.376362-01	.31767E-01	.217746+0
.81468E-0Z	.36865E-02	267615-01	60 21 EE-01	.19615E+3

FOR SUBSURFA	CE 30		A HOERNIL	<u> </u>
.56203E+00	.51296E+00	.36899E+00	.16555£+00	.16322E-01
.03755E-01	.83474E-01	.62159E=01	. 26930E-01	.99553E-03
.64417E-01	.59976E-01	.42390E-01	.16581E-01	31805E-02
-14005E-01	.17769E-01	.13933E-01	.32679E-02	10356E-01
14844E+00	12360E+00	85126E-01	38927E-01	14940E-01
FCR SUBSURFAC	SE 31			
67996E+00	57377E+00	39208E+00	17259E+00	18741E-01
13386E+00	10274E+00	89213E-01	28 222E-01	24223E-02
42457E-01	30642E-01	18754E-01	8958ZE-02	.20596E-02
10723E-01	25425E-02	47929E-03	11 2782-02	.61449E-02
.14121E+00	.12492E+00	.86005E-01	.34585E-01	.65353E-02
FOR SUBSURFAC	E 33			The second second second
23663E+00	580865+00	12 5 39E+01	16995E+01	79758E+00
43758E-01	123142+00	20396E+00	243302+00	.10400E+00
37047E-01	95035E-01	13926E+00	13840E+00	.20607E+00
17294F-01	41695E-01	42407E-01	35046E-02	.31679E+00
.50638E-01	.14732E+00	-299 65 E+00	.43185E+00	.42533E+00
FOR SUBSURF 40	E 34			
.27089E+00	.74493E+00	-13675E+01	.18 664E+01	.10525E+01
.5 C350E-01	.132535+00	.24729E+00	.34503E+00	.59768E-01
.13853E-01	.39664E-01	.878CGE-C1	.13789E+JC	13319E+00
.88585E-03	.30078E-02	.23352E-01	.47707E-01	20028E+00
63241E-01	15356E+00	28045E+c0	3417CE+00	263625+10

SAMPLE CASE 3:

BO-105 FUSELAGE (NO PYLON, NO ROTOR) WITH EFFECTS OF SEPARATION

Data Input

3									
PROGRAM :	SHAPES								
HUB PYLO			RATIO	V					
FUSELAGE	- WIT	H SEF	ARATI	ON EF	FECTS				
KREAD	0								
•	12	0	0						
**	0	1	1	1	0	0	0	0	D
***	U	1							•
UAMCH		204	3.	000	-0.	000			
ALFA	0.	000	0.	000					
ABODA	0.	000	12.	000	38.	000	41.	000	
YOOE	0.	000	3.	300	J.	FEC		000	
NBODY	0.	000	0.	000		000		000	
AGODA	7.	250	3.	250		250		25 0	
WAKE	1	0	0	0					
PYLON	1	1							
STAG	-20.	204	1.						
PRINT	1	1	1	1	0	1	1	1	1
BODY1	4		2	1	1		•		•
1BODY2	4	14	1	1	1				
NBODY3	4	4	2	1	1				

Specifications of the Problem

FOR PART 1 NX= 4 NY= 4 FOR PART 2 NX= 4 NY= 4 FCR_FART_____ NX= 4 NY= 4 FOR FART 5 NX= 4 NY= 4 FCR FART & NX= 4 NY= 4 FOR FART 7 NX= 4 NY= 4 FOR PAFT 9 NX= 4 NY= 4 FOR FART 10 NX= 4 NY= 4 FOR PAFT 11 NX= 4 FOR PAFT 13 NY= 4 FOR FART 14 NX= 4 NY= 4 FOR PAPT 15 NX= 4 NELE == 1 32 KSYMMY= 0

X, Y, and Z Coordinates of the Nodes

NOCE =	×		4	2
1	0.000		. 30330	_3.01000
2 3	3.000		.00000	2.06250
4	€.750	103 -	.00000	1.15743
5	12.000	100	.36366	1.00560
7	3.000	103 1	. 36723	3.61130
8	12.00		.77-45	5.71650 7.62201
10	.75	00 1	. 23153	1.45841
11	3.000		.56326	2.51682 37522
13_	12.000	100 5	.12552	5.83363
15	3.000	100 3	. 37453	.76923 1,57957
16 17	12.000	100 5	.59313	3.15714
18	.75	100 1	.81250	0.00000
19	6.75		. 63750	0.00000
;1	12.000	100 7	.25000	3.00000
;2 ;3	25.000	100 -	.00000	8.25000 3.25000
14	31.50	100 -	. 30333	9.25000
	10.30	00 2	.71445	7.12201
27	25.00	(0)	.774-5	7.12201 7.12201 7.12201
29	31.500	100 2	.77445	7.12201
30	15.300	133	.12562	5.83363
31	31.50	101	.12302	5.83363
	31.000	33	112:12	3. c3353
34	25.000	100	.51513	3.1571-
36 37	31.500	101 5	.59013	3. 15 71 -
35	18.500	100 7	.25000	0.60000
40	31.500	100	.253.0	3.00000
41	36.36	101 7	.25000	0.00000
42	39.312	100 -	.00000	5.18/50
14	\$0.812	31 -	.00100	2.05251
	39.31	51 2	.38354	3.71450
47	40.230	101 1	.3:723	3.51103
49	39.312	513	.39331	4.37322
50	+6.251	101 5	.5:326	2.91.82
51	39.31	51 5	.02359	2.36795
54	41.23	122 3	. 34325	.78926
55	34.312	31	.67453	2.00000
56 57	40.24	000 3	.52510	0.00000
58	.750	100 -	.00130	-2.06250
	6.75	101	.30330	-5.13750
	12.000	101	-00310	-8.25100
13	3.03	100	.36723	-1.90550
£4	6.75	101 5	.0805+	-5.71550
65	12.000	103 2	.251 13	-7.62201
17	3.00	100 _ 2	. 23322	-2.51532
10	75	103 3	1.24.59	375 22

THIS PAGE IS BEST QUALITY PRACTICARING FROM COPY FURNISHED TO DDC

THIS PAGE IS BEST QUALITY PRACTICABLE FROM COPY FURNISHED TO DDC

£9	12.00000	3.12532	-5. :3363
70	.75 101	1.573	79928
71	3.00000	3.36905	-1.:7357
72	6.75 999	5.02353	-2.36 63
73	12.00003	6.59913	-3.1771-
74	10.50001	30030	
			-3.25 400
75	23.1. ::	1.:::	_=3.23:01
70	31.53003	13333	-4.27330
77	30.10177	. 10000	-8.25 200
73	1	2.77442	-7.(2201
		2111443	-1.(2231
79	55.30011	2.775	-7.6221L
50	31.27000	2.77%5	-1.12201
51	32.31000	2.77 5	-7. 62201
82	18.50000	1.12::2	-E . 83363
13	25.1000	5.125.2	-5.63363
94	31.3	1.123.2	-d. 63763
c5	30.00000	3.12522	-5 . £33£3
86		6.59313	
			-3.15714
87	25.00001	5. 39313	-3.1:714
68	31.50000	3.59313	-3.15714
t 5	35.03003	3.53313	-3.13714
90		30000	-0.15-50
	39.31230	300 0	
91	+0.25 011	37333	12500
(5	40.31250	36000	-2.05250
93	39.31250	2.362.14	-5.713F:
94	40.25000	1.3:/23	-3.c1100
	0000000		
95	40.31253	.593c1	-1.92550
96	39.31253	3.344:9	-4.37-22
97		2.56326	-2.01582
46	40.51253	1.2:103	-1.45841
		1.22103	2 7:705
99	39.31251	5.12359	-2.36785
100	40.25000	3.3-906	-1.57857
101	40.31251	1.57423	78928
102	.75000	59361	1.9.55
103	3.00000		3.61100
		-1.39723	30011111
104	6.75000	-2.08054	5.71550
			5.71550
104	12.00000	-2.08084	5.71550 7.12201
104 105 106	6.75000 12.00000 .75000	-2.08084 -2.77++5 -1.25163	5.71550 7.62201 1.45841
104 105 106 107	6.75000 12.00000 .75000	-2.08084 -2.77++5 -1.25163 -2.36326	5.71550 7.62201 1.45841 2.91682
104 105 106 127 108	6.75000 12.00000 .75000 3.44611 6.75000	-2.08054 -2.77++5 -1.25163 -2.36326 -3.34409	5.71550 7.62201 1.45841 2.51682 4.37522
104 105 106 107	6.75000 12.00000 .75000 3.44611 6.75000	-2.08084 -2.77++5 -1.25163 -2.36325 -3.34409 -5.12652	5.71550 7.62201 1.45841 2.91682
104 105 106 127 108 109	6.75000 12.00000 .75000 3.44611 6.75000	-2.08084 -2.77++5 -1.25163 -2.36325 -3.34409 -5.12652	5.71650 7.62201 1.45841 2.91682 4.37522 3.83363
104 105 106 107 108 109	6.75000 12.00000 .75000 3.44614 6.75000 12.00001	-2.08084 -2.77++5 -1.25163 -2.36326 -3.34409 -5.12652 -1.37453	5.71650 7.£2201 1.45841 2.91682 4.37522 3.833£3 .73923
104 105 106 127 108 109 110	6.75000 12.00000 .75000 3.4401 6.75000 12.00001	-2.08084 -2.77++5 -1.25163 -2.36326 -3.344.09 -5.12652 -1.57453 -3.34306	5.71650 7.62201 1.45841 2.51682 4.37522 3.83363 .73923 1.57857
104 105 106 127 108 109 110 111	6.75000 12.00000 .75000 3.44614 6.75000 12.00000 .75000 3.00000	-2.08084 -2.77++5 -1.25163 -2.36326 -3.34409 -5.12652 -1.37453 -3.34306 -3.02369	5.71650 7.62201 1.45841 2.91682 4.37522 3.83363 .73923 1.57857 2.39765
104 105 106 107 108 109 110 111 112 113	6.75000 12.00000 .75000 3.44.01 6.75000 12.00001 .75000 3.000000 6.7500	-2.08084 -2.77++5 -1.25163 -2.36326 -3.348-9 -5.12652 -1.57453 -3.34306 -3.02359 -5.39513	5.71550 7.12201 1.45841 2.51682 4.37522 3.83363 .73923 1.57857 2.39765 3.15714
104 105 106 127 108 109 110 111	6.75000 12.00000 .75000 3.44.01 6.75000 12.00001 .75000 3.000000 6.7500	-2.08084 -2.77++5 -1.25163 -2.36326 -3.348-9 -5.12652 -1.57453 -3.34306 -3.02359 -5.39513	5.71650 7.62201 1.45841 2.91682 4.37522 3.83363 .73923 1.57857 2.39765
104 105 106 107 108 109 110 111 112 113 114	6.75000 12.00000 .75000 3.44611 6.75000 12.00000 3.00000 6.75001 12.01001 .75000	-2.08084 -2.77+5 -1.28163 -3.36459 -5.12652 -1.57463 -3.34906 -5.02369 -5.035813 -1.51250	5.71550 7.62201 1.45841 2.91602 4.37522 3.83363 7.923 1.57857 2.36769 3.15714 0.00000
104 105 106 107 108 109 110 111 112 113 114 115	6.75 000 12.00000 .75 000 3.0001 6.75 000 12.00000 3.00000 6.75 001 12.00000 .75 001 3.00000	-2.08084 -2.77+5 -1.28163 -2.36326 -3.344.9 -5.12652 -1.37453 -3.34306 -3.02359 -5.13813 -1.51250 -3.62500	5.71550 7.62201 1.45841 2.51682 4.37522 3.83363 7.5923 1.57857 2.35765 3.15714 0.00000
104 105 106 107 108 109 110 111 112 113 114 115	6.75000 12.00000 .75000 3.4LF11 6.75000 12.00001 .75000 3.00000 6.7570 12.00001 .75000 3.000002 6.757000	-2.08084 -2.77+5 -1.25163 -2.36326 -3.34459 -5.1262 -1.57453 -3.34306 -3.02369 -3.363500 -3.62500 -5.4733	5.71650 7.£2201 1.45841 2.61682 4.37622 3.83363 .73923 1.57857 2.35765 3.15714 0.00700 2.00000
104 105 106 107 108 109 110 111 112 113 114 115 116 117	6.75000 12.00000 .75000 3.44614 6.75000 12.00000 3.00000 6.75000 12.03000 .75000 3.00000 0.75000 3.00000	-2.08084 -2.77+5 -1.28163 -2.36325 -3.34409 -5.12652 -1.57453 -3.34306 -5.02559 -5.02559 -5.02559 -5.02559 -5.02559 -5.02559 -5.02559 -7.2711	5.71650 7.62201 1.45841 2.91682 4.37522 3.83363 7.3923 1.57857 2.39765 3.15714 0.00100 1.00000 0.00100 1.1000
104 105 106 107 108 109 110 111 112 113 114 115 116	6.75 000 12.00000 .75 000 3.00011 6.75 000 12.00000 6.75 000 3.00000 6.75 000 3.00000 6.75 000 3.00000 12.00000 6.75 000 12.00000 12.00000 12.000000 12.0000000000	-2.08084 -2.77-45 -1.28163 -2.36326 -3.34409 -5.12652 -1.57453 -3.34306 -3.02369 -3.39813 -1.51250 -3.62500 -5.43731 -7.27310 -2.77445	5.71550 7.62201 1.45841 2.91682 4.37522 3.8353 1.57857 2.36765 3.15714 0.00700 1.00000 1.1000 1.1000 1.1000 1.1000 1.1000 1.1000
104 105 106 107 108 109 110 111 112 113 114 115 116	6.75 000 12.00000 .75 000 3.00011 6.75 000 12.00000 6.75 000 3.00000 6.75 000 3.00000 6.75 000 3.00000 12.00000 6.75 000 12.00000 12.00000 12.000000 12.0000000000	-2.08084 -2.77-45 -1.28163 -2.36326 -3.34409 -5.12652 -1.57453 -3.34306 -3.02369 -3.39813 -1.51250 -3.62500 -5.43731 -7.27310 -2.77445	5.71550 7.62201 1.45841 2.91682 4.37522 3.8353 1.57857 2.36765 3.15714 0.00700 1.00000 1.1000 1.1000 1.1000 1.1000 1.1000 1.1000
104 105 106 107 108 109 110 111 112 113 114 115 116 117	6.75 000 12.00000 .75 000 3.0111 6.75 000 12.00000 6.75 000 3.00000 6.75 000 3.00000 6.75 000 12.00000 12.00000 12.00000 12.000000 12.0000000000	-2.08084 -2.77+5 -1.25163 -2.36826 -3.34859 -5.12652 -1.57453 -3.34306 -3.02359 -3.0235	5.71550 7.62201 1.45841 2.51682 4.37522 3.83163 7.3923 1.57857 2.35765 3.15714 0.00000 0.00000 0.000000 7.600000 0.000000 7.6000000 0.0000000000
104 105 106 107 108 109 110 111 112 113 114 115 116 117 116 117	6.75 000 12.00000 .75 000 3.44 011 6.75 000 12.00001 .75 000 3.00 000 6.75 001 12.00 000 6.75 000 12.00 000 12.00 000 12.00 000 12.00 000 12.00 000 12.00 000 12.00 000 12.00 000 12.00 000 12.00 000 12.00 000 12.00 000 12.00 000 12.00 000	-2.08084 -2.77+5 -1.25163 -2.36326 -3.34459 -5.1252 -1.57453 -3.34306 -3.02359 -3.02359 -3.02359 -3.02500 -3.62500 -3.62500 -3.62500 -3.77455 -2.77455	5.71650 7.£2201 1.45841 2.91682 4.37522 3.833£3 7.3923 1.57857 2.39765 3.15714 0.00000 0.00000 1.6200 7.62201 7.62201
104 105 106 127 108 109 110 111 112 113 114 115 116 117 118 119 120 121	6.75000 12.00000 .75000 3.00011 6.75000 12.00000 3.00000 6.75000 3.00000 6.75000 3.00000 6.75000 3.00000 12.00000 6.75000 3.00000 3.000000 6.75000 3.000000000000000000000000000000000	-2.08084 -2.774-5 -1.28163 -3.36409 -5.12652 -1.57463 -3.34306 -3.02369 -3.34306 -3.02369 -3.34306 -3.02369 -3.34306 -3.02369 -3.34306 -3.02369 -3.34306 -3.02369 -3.34306 -3.02369 -3.34306 -3.02369 -3.34306 -3.02369 -3.34306 -3.02369 -3.34306 -3.02369 -3.34306 -3.02369 -3.34306 -3.02369 -3.34306 -3.02369 -3.34306 -3.02369 -3.34306 -3.02369 -3.34306 -3.02369 -3.023	5.71550 7.62201 1.45841 2.91602 4.37522 3.83363 7.923 1.57857 2.35765 3.15714 0.00000 2.00000 1.1600 7.62201 7.62201 7.62201
104 105 106 107 108 109 110 111 112 113 114 115 116 117 116 119 120 121	6.75 000 12.00.000 .75 000 3.00.01 6.75 000 3.00.000 6.75 00 3.00.000 6.75 00 3.00.000 6.75 00 3.00.000 6.75 00 3.00.000 6.75 00 3.00.000 6.75 00 3.00.000 6.75 00 3.00.000 6.75 00 6.	-2.08084 -2.77+5 -1.25163 -2.36826 -3.34859 -5.12652 -1.57453 -3.3430 -3.02359	5.71550 7.62201 1.45841 2.91682 4.37522 3.83163 1.57857 2.39765 3.15714 0.00700 2.00000 0.01700 7.62201 7.62201 7.62201 7.62201 7.62201 J.63333
104 105 106 127 108 109 110 111 112 113 114 115 116 117 118 119 120 121	6.75000 12.00000 .75000 3.00011 6.75000 12.00000 3.00000 6.75000 3.00000 6.75000 3.00000 6.75000 3.00000 12.00000 6.75000 3.00000 3.000000 6.75000 3.000000000000000000000000000000000	-2.08084 -2.774-5 -1.28163 -3.36409 -5.12652 -1.57463 -3.34306 -3.02369 -3.34306 -3.02369 -3.34306 -3.02369 -3.34306 -3.02369 -3.34306 -3.02369 -3.34306 -3.02369 -3.34306 -3.02369 -3.34306 -3.02369 -3.34306 -3.02369 -3.34306 -3.02369 -3.34306 -3.02369 -3.34306 -3.02369 -3.34306 -3.02369 -3.34306 -3.02369 -3.34306 -3.02369 -3.34306 -3.02369 -3.34306 -3.02369 -3.023	5.71550 7.62201 1.45841 2.91602 4.37522 3.83363 7.923 1.57857 2.35765 3.15714 0.00000 2.00000 1.1600 7.62201 7.62201 7.62201
104 105 106 107 108 109 110 111 112 113 114 115 116 117 116 117 110 120 121	6.75 000 12.00000 .75 000 3.4LC11 6.75 000 12.00001 .75 000 3.00 000 6.75 001 12.01 000 12.05 000 12.05 000 12.05 000 12.05 000 12.05 000 12.05 000 12.05 000 12.05 000 12.05 000 12.05 000 12.05 000 12.05 000 12.05 000 12.05 000 12.05 000 12.05 000 12.05 000 12.05 000 12.05 000	-2.08084 -2.77+5 -1.25163 -2.36326 -3.34459 -5.1262 -1.57453 -3.34306 -3.02369	5.71650 7.£2201 1.45841 2.91682 4.37522 3.833£3 .73923 1.57857 2.35765 3.15714 0.00000 2.00000 7.62201 7.62201 7.62201 7.62201 7.62201 7.623333 5.63363
104 105 106 107 108 109 110 111 112 113 114 115 117 116 117 118 119 120 121 122 123 124	6.75000 12.000001 2.000001 3.00001 2.000001 3.000000 3.000000000000000000000	-2.08084 -2.77+5 -1.28163 -2.36325 -3.34459 -5.12652 -1.57453 -3.02359 -3.02359 -3.02359 -3.02359 -3.0250 -3	5.71650 7.62201 1.45841 2.91682 4.37522 3.83363 7.3923 1.57857 2.39765 3.15714 0.00000 1.60000 1.60000 7.62201 7.62201 7.62201 7.62201 7.62201 7.623363 5.63363 5.63363
10+ 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 124	6.75000 12.00000 .75000 3.00001 2.00000 6.75000 3.00000 6.75000 3.00000 6.75000 3.00000 6.75000 3.00000 6.75000 3.00000 6.75000 3.00000 6.75000 3.00000 6.75000 3.00000 3.000000 3.0000000000000000	-2.08084 -2.774-5 -1.28163 -3.36409 -5.12652 -1.57453 -3.34306 -5.02359 -5.03513 -1.51250 -3.62500 -5.43751 -2.774-5 -2.774-5 -2.774-5 -2.774-5 -2.774-5 -3.12572 -3.12572 -3.12572 -3.12572	5.71550 7.62201 1.45841 2.91682 4.37522 3.83363 7.3923 1.57857 2.35763 3.15714 0.00000 2.00000 1.1000 7.62201 7.62201 7.62201 7.62201 7.62201 7.62303 5.63363 5.63363 5.63363
104 105 106 107 108 109 110 111 112 113 114 115 116 117 116 117 118 120 121 121 122 123 124 125	6.75000 12.00000 17.000 3.00001 12.00000 3.00000 3.00000 12.000000 3.00000 3.00000 3.00000 3.00000 3.00000 3.00000 3.00000 3.00000 3.00000 3.00000 3.00000 3.00000 3.00000 3.00000 3.00000 3.00000 3.00000 3.000000 3.00000000	-2.08084 -2.77-4-5 -1.25163 -2.36326 -3.34459 -5.12652 -1.57463 -3.02369	5.71650 7.£2201 1.45841 2.91682 4.37622 3.83363 .73923 1.57857 2.35765 3.15714 0.00000 2.00000 2.00000 7.62201 7.62201 7.62201 7.62201 7.62363 5.63363 5.63363 5.63363 3.15714
10+ 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 124	6.75000 12.00000 .75000 3.00001 2.00000 3.00000 6.75000 3.00000 6.75000 3.00000 12.00000 3.00000 12.00000 3.00000 12.00000 3.00000 12.00000 31.50000 31.50000 31.50000 31.50000 31.50000 31.50000 31.50000 31.50000 31.50000 31.50000 31.50000 31.50000 31.50000 31.50000 31.50000 31.50000	-2.08084 -2.77+5 -1.28163 -2.36326 -3.34469 -5.12652 -1.57453 -3.34306 -3.02359 -3.39313 -1.51250 -3.62500 -5.43750 -7.2714 -2.77445 -2.77445 -2.77445 -2.77445 -2.77445 -2.7745 -2.7745 -2.7745 -2.7745 -2.7745 -2.7745 -2.7745 -3.1252	5.71650 7.62201 1.45841 2.91682 4.37522 3.83363 7.923 1.57857 2.39765 3.15714 0.00000 1.6160 7.62201 7.62201 7.62201 7.62201 7.62201 7.623333 5.63363 5.63363 3.15714 3.15714
104 105 106 107 108 109 110 111 112 113 114 115 116 117 116 117 118 120 121 121 122 123 124 125	6.75000 12.00000 .75000 3.00001 2.00000 3.00000 6.75000 3.00000 6.75000 3.00000 12.00000 3.00000 12.00000 3.00000 12.00000 3.00000 12.00000 31.50000 31.50000 31.50000 31.50000 31.50000 31.50000 31.50000 31.50000 31.50000 31.50000 31.50000 31.50000 31.50000 31.50000 31.50000 31.50000	-2.08084 -2.77+5 -1.28163 -2.36326 -3.34469 -5.12652 -1.57453 -3.34306 -3.02359 -3.39313 -1.51250 -3.62500 -5.43750 -7.2714 -2.77445 -2.77445 -2.77445 -2.77445 -2.77445 -2.7745 -2.7745 -2.7745 -2.7745 -2.7745 -2.7745 -2.7745 -3.1252	5.71650 7.62201 1.45841 2.91682 4.37522 3.83363 7.923 1.57857 2.39765 3.15714 0.00000 1.6160 7.62201 7.62201 7.62201 7.62201 7.62201 7.623333 5.63363 5.63363 3.15714 3.15714
104 105 106 107 108 109 110 111 112 113 114 115 116 117 110 120 121 122 123 124 127 126	6.75000 12.00000 .75000 3.00001 2.00000 3.00000 6.75003 3.00000 6.75003 3.00000 6.75003 3.00000 6.75003 3.00000 6.75003 3.00000 6.75003 3.00000 6.75000 3.00000 12.00000 13.50000 14.50000 14.50000 14.50000 14.5000000000000000000000000000000000000	-2.08084 -2.774+5 -1.28163 -3.36459 -5.12652 -1.57463 -3.34306 -5.02369 -5.39813 -1.51250 -2.77445 -2.77445 -2.77445 -2.77445 -2.77445 -2.77445 -2.77445 -2.77445 -2.77445 -2.77445 -2.77445 -2.77445 -2.77445 -3.12652	5.71650 7.62201 1.45841 2.91682 4.37522 3.83363 7.923 1.57857 2.36769 3.15714 0.00000 1.00000 1.1000 7.62201 7.62201 7.62201 7.62201 7.62201 7.62201 5.63363 5.63363 3.15714 3.15714
104 105 106 107 108 110 111 112 113 114 115 116 117 116 117 118 120 121 122 123 124 127 120 127	6.75 000 12.00000 12.00000 12.01000 12.01000 12.01000 12.01000 12.01000 12.01000 12.01000 12.01000 12.01000 12.01000 12.010000 12.01000000 12.010000000000	-2.08084 -2.774-5 -1.25163 -2.36826 -3.34459 -5.12652 -1.57453 -3.34306 -3.02359 -5.33613 -1.51250 -3.62500 -5.43730 -7.25316 -2.77445 -2.77445 -2.77445 -2.77445 -2.77445 -2.77445 -3.12552	5.71650 7.42201 1.45841 2.61682 4.37622 3.83763 1.57857 2.35763 3.15714 0.00700 2.000700 2.000700 2.12001 7.62201 7.62201 7.62201 7.62201 7.62201 7.62363 5.63363 5.63363 5.63363 3.15714 3.15714 3.15714
104 105 106 107 108 109 110 111 112 113 114 115 116 117 116 117 120 121 122 123 124 125 126 127 126 127	6.75 000 12.00.000 12.0000 12.00000 12.00000 12.000000 13.500000 13.500000 13.5000000000000000000000000000000000000	-2.08084 -2.77+5 -1.25163 -2.36326 -3.14459 -5.12652 -1.57453 -3.34306 -3.32369 -3.32369 -3.32362500 -3.42362 -7.27445 -2.77445 -2.77445 -2.7745 -2.7745 -2.7745 -2.7745 -2.7745 -2.7745 -2.7745 -2.7745 -2.7745 -3.1232	5.71650 7.62201 1.45841 2.61682 4.37622 3.3363 7.3923 1.57857 2.39765 3.15714 0.00000 0.00000 1.6201 7.62201 7.62201 7.62201 7.62201 7.62201 7.62201 7.62363 5.63363 5.63363 3.15714 3.15714 3.15714 3.15714 3.15714
104 105 106 107 108 109 110 111 112 113 114 115 117 116 117 118 120 121 122 123 124 127 126 127 128 129 120 121 121 121 121 121 121 121 121 121	6.75000 12.00000 .75000 3.00001 2.00000 3.00000 6.75000 3.00000 6.75000 3.00000 6.75000 3.00000 3.00000 3.00000 12.00000 3.00000 3.00000 12.00000 31.50000 31.50000 31.50000 31.50000 31.50000 31.50000 31.50000 31.50000 31.50000 31.50000 31.50000	-2.08084 -2.77+5 -1.28163 -3.36469 -5.12652 -1.57453 -3.34306 -5.02359 -5.12652 -7.455 -7.77+5 -2.77445 -2.77445 -2.77445 -2.77445 -2.77445 -2.77445 -2.7745 -3.1252 -5.1252 -5.12552 -5.12552 -5.12552 -5.12552 -5.12552 -5.12552 -5.12552 -7.25030 -7.25030	5.71650 7.62201 1.45841 2.91682 4.37522 3.83363 7.923 1.57857 2.39765 3.15774 0.00000 1.6160 7.62201 7.62201 7.62201 7.62201 7.62201 7.623303 5.63363 3.15714 3.15714 3.15714 3.15714 3.15714
104 105 106 107 108 109 110 111 112 113 114 115 116 117 116 117 120 121 122 123 124 125 126 127 126 127	6.75 000 12.00.000 12.0000 12.00000 12.00000 12.000000 13.500000 13.500000 13.5000000000000000000000000000000000000	-2.08084 -2.77+5 -1.28163 -3.36469 -5.12652 -1.57453 -3.34306 -5.02359 -5.12652 -7.455 -7.77+5 -2.77445 -2.77445 -2.77445 -2.77445 -2.77445 -2.77445 -2.7745 -3.1252 -5.1252 -5.12552 -5.12552 -5.12552 -5.12552 -5.12552 -5.12552 -5.12552 -7.25030 -7.25030	5.71650 7.62201 1.45841 2.61682 4.37622 3.3363 7.3923 1.57857 2.39765 3.15714 0.00000 0.00000 1.6201 7.62201 7.62201 7.62201 7.62201 7.62201 7.62201 7.62363 5.63363 5.63363 3.15714 3.15714 3.15714 3.15714 3.15714
104 105 106 107 108 109 110 111 112 113 114 115 116 117 110 117 110 120 121 122 123 124 127 126 127 126 129 130	6.75 000 12.00000 12.00000 12.01000 12.01000 12.01000 12.01000 12.01000 12.01000 12.01000 12.01000 12.01000 12.01000 12.01000 12.01000 12.01000 12.01000 12.01000 12.01000 12.010000 12.010000000000	-2.08084 -2.774-5 -1.25163 -2.36826 -3.348-9 -5.12652 -1.574-53 -3.34-96 -3.02359 -5.39813 -1.51250 -3.62500 -5.43750 -7.25716 -2.774-5 -2.774-5 -2.774-5 -2.774-5 -2.774-5 -2.774-5 -2.774-5 -2.774-5 -2.774-5 -3.12522 -5.12552 -3.12522 -5.12552 -3.12522 -5.39813 -5.59813 -7.25070 -7.25070	5.71650 7.42201 1.45841 2.61682 4.37622 3.83363 7.3923 1.57857 2.35765 3.15714 0.00700 2.00000 2.11001 7.62201
104 105 106 107 108 109 110 111 112 113 114 115 116 117 116 117 118 120 121 123 124 123 124 125 126 127 126 127 126 127 126 127 127 128 129 120 120 121 121 121 121 121 121 121 121	6.75 000 12.00000 12.00000 12.00000 12.00000 12.000000 12.000000 12.000000 12.0000000000	-2.08084 -2.77+5 -1.25163 -2.36326 -3.34459 -5.1262 -1.57453 -3.35306 -3.32369 -3.32369 -3.32369 -3.323625 -3.62500 -5.43730 -7.25310 -2.77445 -2.77445 -2.77445 -2.77445 -3.1252 -3.25300 -7.253000 -7.253000	5.71650 7.62201 1.45841 2.91682 4.37622 3.83363 7.3923 1.57857 2.39765 3.15714 0.00000 2.00000 2.1200 7.62201 7.62201 7.62201 7.62201 7.62201 7.62201 7.62201 7.62201 7.62201 7.62201 7.62201 7.62201 7.62201 7.62201 7.62100 0.00000 0.00000 0.00000 0.000000 0.00000 0.00000 0.000000
104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 120 121 122 123 124 127 126 127 126 127 127 130 131 131 131 131 141 151 161 171 171 171 171 171 171 171 171 17	6.75 000 12.000000 12.0000000000	-2.08084 -2.77+5 -1.25163 -2.36326 -3.14459 -5.12652 -1.57453 -3.34306 -3.02359 -3.162500 -5.43730 -7.2714 -2.77445 -2.77445 -2.77445 -2.77445 -2.77445 -2.7745 -3.1252	5.71650 7.62201 1.45841 2.91682 4.37522 3.83363 7.923 1.57857 2.39765 3.15714 0.00200 0.00200 1.6160 7.62201 7
104 105 106 107 108 109 110 111 112 113 114 115 116 117 110 120 121 122 123 124 127 126 127 126 127 127 126 127 127 128 127 128 127 128 127 128 129 129 120 120 120 120 120 120 120 120 120 120	6.75 000 12.00000 12.00000 12.01000 12.01000 12.01000 12.01000 12.01000 12.01000 12.01000 12.01000 12.01000 12.01000 12.01000 12.01000 12.01000 12.01000 12.01000 12.010000 12.0100000 12.010000000000	-2.08084 -2.774-5 -1.25163 -2.36326 -3.34459 -5.12652 -1.57453 -3.32369 -5.39813 -1.51250 -7.25316	5.71650 7.42201 1.45841 2.91682 4.37522 3.83363 7.3923 1.57857 2.35765 3.15714 0.00700 2.00000 2.11001 7.62201
104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 120 121 122 123 124 127 126 127 126 127 127 130 131 131 131 131 141 151 161 171 171 171 171 171 171 171 171 17	6.75 000 12.000000 12.0000000000	-2.08084 -2.77+5 -1.25163 -2.36326 -3.14459 -5.12652 -1.57453 -3.34306 -3.02359 -3.162500 -5.43730 -7.2714 -2.77445 -2.77445 -2.77445 -2.77445 -2.77445 -2.7745 -3.1252	5.71650 7.62201 1.45841 2.91682 4.37522 3.83363 7.923 1.57857 2.39765 3.15714 0.00200 0.00200 1.6160 7.62201 7
104 105 106 107 108 109 110 111 112 113 114 115 116 117 110 120 121 123 124 125 127 120 127 120 121 121 121 123 124 125 127 120 121 121 121 121 121 121 121 121 121	6.75 000 12.00.000 12.00.000 12.00.000 12.00.000 12.00.000 3.00.000 12.0000 13.50.000 13.50.000 13.50.000 13.50.0000 13.50.0000 13.50.0000 13.50.0000 13.50.0000 13.50.0000 13.50.0000 13.50.0000 13.50.0000 13.50.0000 13.50.00000 13.50.00000 13.50.0000000000000000000000000000000000	-2.08084 -2.77-4-5 -1.28163 -2.36326 -3.34463 -5.12652 -1.57463 -3.02369 -5.02369 -5.02369 -5.02369 -7.27745 -2.77465 -2.77465 -2.77465 -2.77465 -2.77465 -2.77465 -2.77465 -2.77465 -2.77465 -3.12652 -3	5.71650 7.£2201 1.45841 2.91682 4.37622 3.83363 .73923 1.57857 2.35765 3.15714 0.00000 2.00000 2.1200 7.62201 7.62201 7.62201 7.62201 7.62201 7.62201 7.62201 7.62201 7.62201 7.62201 7.62201 7.62201 7.62201 7.62100 0.00000 0.00000 0.000000 0.000000000
104 105 106 107 108 109 110 111 112 113 114 115 116 117 116 117 116 120 121 123 124 125 126 127 126 127 128 130 131 131 131 141 151 161 171 171 181 181 181 181 181 181 181 18	6.75000 12.00000 12.00000 12.00000 12.00000 12.00000 12.00000 12.00000 12.00000 12.00000 12.00000 12.00000 12.00000 12.00000 12.00000 12.00000 12.00000 12.00000 12.000000 12.0000000000	-2.08084 -2.77+5 -1.25163 -2.36326 -3.14459 -5.1252 -1.57453 -3.34306 -3.32369 -3.32369 -3.3236 -3.3236 -3.3236 -3.3236 -3.3236 -3.3236 -3.3236 -3.3236 -3.3236 -3.3236 -3.3236 -3.3236 -3.3236 -3.3236 -3.3236 -3.3236 -3.3336 -3.3336 -3.3336 -3.3336 -3.3336	5.71650 7.62201 1.45841 2.91682 4.37522 3.83363 7.923 1.57857 2.39765 3.15714 0.00200 0.00200 1.6201 7.62201 7.62201 7.62201 7.62201 7.62201 7.62333 3.15714
104 105 106 107 108 110 111 112 113 114 115 116 117 116 117 116 117 118 120 121 122 123 124 129 120 121 121 123 124 125 127 126 127 128 129 120 120 121 121 121 121 121 121 121 121	6.75000 12.00000 12.00000 12.00000 12.00000 12.00000 12.00000 12.00000 12.00000 12.00000 12.00000 12.00000 12.00000 12.00000 13.50000 13.50000 14.50000 15.50000 16.50000 16.50000 16.50000 16.50000 16.50000 16.50000 16.50000 16.50000 16.50000 16.50000 16.50000 16.50000 16.50000 16.50000 16.50000 16.50000 16.50000 16.500000 16.500000 16.5000000000000000000000000000000000000	-2.08084 -2.77+5 -1.28163 -3.36469 -5.12652 -1.57453 -3.34306 -5.2559 -5.39813 -1.51250 -3.62500 -5.43750 -7.2716 -2.77465 -3.384620	5.71550 7.62201 1.45841 2.91682 4.37522 3.83363 7.923 1.57857 2.39765 3.15714 0.00000 1.1100 7.62201 7.62201 7.62201 7.62201 7.62201 7.62201 7.62201 7.62201 0.03363 3.15714
104 105 106 107 108 109 110 111 112 113 114 115 116 117 110 120 121 123 124 123 124 125 127 120 121 121 120 121 121 121 123 124 125 127 120 121 121 121 121 121 121 121 121 121	6.75 000 12.00.000 12.00.000 12.00.000 12.00.000 12.00.000 3.00.000 12.00.000 12.00.000 12.00.000 12.00.000 12.00.000 12.00.000 12.00.000 12.00.000 12.00.000 12.00.000 12.00.000 12.00.000 12.00.000 12.00.000 12.00.000 12.00.000 12.00.000 12.00.000 12.0000 12.00000 12.000000 12.0000000000	-2.08084 -2.774-5 -1.25163 -2.36326 -3.34459 -5.12652 -1.57463 -3.02369 -5.02369 -5.02369 -5.02369 -7.25010 -2.77465 -2.775500 -7.25000	5.71650 7.£2201 1.45841 2.91682 4.37622 3.83163 .73923 1.57857 2.35765 3.15714 0.00000 2.00000 2.12001 7.62201
104 105 106 107 108 110 111 112 113 114 115 116 117 116 117 116 117 118 120 121 122 123 124 129 120 121 121 123 124 125 127 126 127 128 129 120 120 121 121 121 121 121 121 121 121	6.75000 12.00000 12.00000 12.00000 12.00000 12.00000 12.00000 12.00000 12.00000 12.00000 12.00000 12.00000 12.00000 12.00000 13.50000 13.50000 14.50000 15.50000 16.50000 16.50000 16.50000 16.50000 16.50000 16.50000 16.50000 16.50000 16.50000 16.50000 16.50000 16.50000 16.50000 16.50000 16.50000 16.50000 16.50000 16.500000 16.500000 16.5000000000000000000000000000000000000	-2.08084 -2.77+5 -1.28163 -3.36469 -5.12652 -1.57453 -3.34306 -5.2559 -5.39813 -1.51250 -3.62500 -5.43750 -7.2716 -2.77465 -3.384620	5.71550 7.62201 1.45841 2.91682 4.37522 3.83363 7.923 1.57857 2.39765 3.15714 0.00000 1.1100 7.62201 7.62201 7.62201 7.62201 7.62201 7.62201 7.62201 7.62201 0.03363 3.15714

141	+0.25 100	-3.3-906	1.57057
142	-0.81 25 J	-1.57453	. 78928
143	39.31250	-5.437 10	0.00000
144	-c. 25:0:	-3. 525. 0	3.63.35
145	40.01253	-1.31250	3.00000
146	.75 003	59361	-1.405FC
147	3.00000	-1,38723	-3.c1100
148	6.75003	-2.0803+	-5.71650
149	12.03.2.	-2.77445	-7.62201
150	.75 103	-1.25153	-1.45841
_151	3.00000	-2.55326	-2.41682
152	6.75000	-3.34439	-4.37522
153	12.00000	-5.12322	-i. £3363
154	.75000	-1.57453	75 928
155	3.00000	-3.34316	-1. 57957
156	6.75000	-5.02379	-2.36765
157	12.00000	-5.59913	-3.15 714
150	18.32 33	-2.17445	-7.82201
159	25.00000	-2.774-5	-7.02201
160	31.50000	-2.77++5	-7.+2261
161	3:.00000	-2.17445	-7 . [2231 .
162	10.5: 3.	-1.123 12	-3. 13363
153	25.00000	-3.123.2	23363
164	31.50000	-5.12552	-5. 83363
165	38.00000	- 1.12512	- 1. 63363
160	18.53003	-5.59413	-3.15714
157	2	-1.19713	-3.1. 716
1 50	31.50000	-0.03013	-3.15714
169	39.00000	-3.59913	-3.15 71-
170	39.31253	-2.10104	-5 1 . 5 6
171	41 . 23	-1.35723	-3.0110.
1/2	40.31257	595 1	-1.49 (F)
173	39.31251	-3.0-+09	-+.37522
17-	.0.2000J	-2.55325	-2.41 -2
175	46.81251	-1.23163	-1.45441
170	70 71 75	-1.:23:9	-2.3:78;
	39.31250		-2000111
177	40.25000	-3.3,306	-1.57057

THIS PAGE IS BEST QUALITY PRACTICARING

X, Y, and Z Coordinates of the Centroid of Aerodynamic Panels

ELEM= XPC	YPC	ZFC
1 .3.305	.17340	. 13261
2 1.91528	.52021	2.37650
3 4. 97772	35702	
4 9.57530	1.21352	5.3-4.00
5 .36306	. + 3331	. 8-0 43
0 1.91525	111-5	2.52293
.51676.4 7	2.4.3. : -	3.2.452
6 9.37.30	3. 1.33:	3.00664
9 .38366	.7393-	.5c152
10 1.91326	2.21712	1.55577
11 97972	3.59527	2.509:2
12 9.57538 13 .38306	.37175	3. 33345
14 1.91528	2.01:27	• 197 32 • 5 91 96
	4.35673	.93661
	3.13231	1.35129
16 9.57538	1.33723	7.936.30
18 22.21721	1.36723	7.936 00
19 26.35003	1.30723	7.93600
20 35.496-6	1.33723	7.936.0
21 15.57758	3. 35043	5.727.2
22 22.21721	3. 95 049	6.727.2
23 28.85683	3. 35 0+9	6.72782
24 35.49346	3. 35049	5.727.2
25 15.57758	5.31233	4.49539
26 22.21721	5.91233	4.49539
27 28.65663	5. 91233	495 38
28 35.49546	5.91233	+.49538
29 15.57758	6.37+30	1.57857
30 22.21/21	6.3/4:6	1.37857
31 20.55063	6.97475	1.5/857
32 35.49646	6.97406	1.57657
33 39.48652	1,21392	3 . 944 10
34 40.63578	.35732	+.96000
35 41.4.190	.52:21	2.978.
36 41.70495	.173%)	. 992 20
37 39.40562	3.+3653	3 . 986 64
36 40.63575	2.459),	4.234.3
39. 41.40190	131-3	2.52293
40 41.70405	. 42351	. 340 98
41 34. +0562	5.17320	3. 3346
42 40.63578	3.59521	2.80962
43 41.+01-0	2.21712	1.63577
44 41.70499	.739:4	.50102
45_39.48562	5.11231	1.3:125
46 40.63578	4.37871	.986+1
47_41.40190	2.31527	.59195
48 41.78495	.3717.3	.13732
50 1.91528	.52321	99210
50 1.91528	.33702	-4.95000
52 9.57638	1.21352	-5.94410
33 .3d3 6	.43381	04098
54 1.91528	1.401+3	-2.52253
55 4. 97972	2.45935	-4.20489
56 3.57533	3.44653	-9.336:4
_57383:6	./39:1	56152
58 1.91528	2.21712	-1.65577
59 4. 97372	3.59520	-2.80952
60 9.57538	5.17325	-3.93345
61 .3830c	87175	197.32
62 1.91328	2.31527	391=5
63_4.97922_	4.35.373	960t1
64 9.57638	6.10231	-1.35125
		771111 23.

THIS PAGE IS BEST QUALITY PRACTICABLE FROM COPY FURNISHED TO DDC

65	15.57758	1.33723	-7 .936 GO
. 66	22.21721	1.38723	-7 . 9 3E 10
		1.30123	
6Z_	20.45643	1.36723	-7.93600
68	35.49646	1.30723	-7.93E 00
69	15.57758	3.45064	-5.727.2
	22 24 724		
70	22.21721	3.950+9	-6.727 52
71_	28.85063	3.95.49	-5.727.12
72	35.49646	3.35043	-6.727 62
73_	15.57738	5.91233	-4. 9538
74	22.21721	5. 31233	-4.49535
75	28.85583	3.31233	-4.462.19
76	35.49640	5.31233	-4.49536
	32.47040	3.31233	-7.47: 50
77	15.57754	6. 17+36	-1.57657
78	22.21721	5. 37405	-1.57817
79	28.85563	6.77-16	-1.57817
80	35.49040	0.374.3	-1 . 575 .7
		0.314.3	-116-1
51	39.405:2	1.21352	-5.3+4.00
52	-0.03578	.35732	-+.960:0
53	41.401=0	.32021	-2.975 00
		.,,,,,,	
84	41.78495	.1/34.	392 . 7
35	39.4:352	3.4 55.	-3.63664
30	40.63576	2.+533=	20419
87	41.40190	1.9.193	-2.92253
	41.40190	1.4-143	-2.92255
88	-1.79-95	• + 3331	84093
8 7	34.40.2	3.1/32:	-3.93343
90	40.63575	3.01523	-2.005+2
91		2 34743	-1 (05:7
	-1 0190	2.21712	-1.63577
92	41.70455	./307%	1.1.192
93	39.44.6.2	3.1.231	-1.3:14.7
94	40.03570	4.3:0/3	95661
95	41.40190	2.61527	98661
96	41.78495	- 21 2	1 37 32
	41.70495	.3/1/3	- 1 37 32
97	. 38306	1~3-0	.99200
96	1.91328	35702	2.97500
99	4.97972	35702	+. 360 19
100	9.57038	-1.21332	934-60
101	. 30306	4:331	. 540 93
1:2	1.91.28	-1.4:145	2.82293
103	4. 97972	-2.41433	4.234.3
	2 7777		
104	9.57530	-3: 633	3.32664
105	38306	73934	.98192
100	1.91528	-2.21712	1.63577
167	4.97972	-3.3932.	2.019.2
108	9.57136	-5.1732	3.93345
		-2411 352	
109_	.383Cb	87170	. 19732
110	1.91925	-2.31527	.59195
111_	4.97972	-4.33372	986.1
112	9.57538	-5.10231	1.3.125
	45 57750	-4 70 727	7 276 10
113_	15.57756	-1.38723	7.936 10
114	22.21721	-1.38723	7.93600
115	28.85683	-1.39723	7.93600
116			
110	35.49346	-1. 73723	7.936 00
	15.57750	-1.33723	7.93600
117_	15.57750	-3.350-2	6.727.62
117-	15.27750	-3.950+2	0.727±2 0.72782
117 118 119	15.57750	-3.350+2 -3.95049 -3.95049	6.727.62
117-	15.27750	-3.950+2	0.727±2 0.72782
117 118 119 120	15.57750 22.21721 20.056c3 35.49646	-3.350-2 -3.95049 -3.95049 -3.95049	6.727.22 6.727.22 5.727.2 6.727.2
117 118 119 120	15.57750 22.21721 20.05663 35.49646 15.57758	-3.350+2 -3.95049 -3.95049 -3.95049 -5.91233	6.72742 6.72782 5.72722 5.72742 6.42538
117 118 119 120 121 122	15.57750 22.21721 20.05643 35.49646 15.57758 22.21721	-3.950+9 -3.95049 -3.95049 -3.95049 -5.91233 -5.91233	6.72742 6.72782 5.727.2 3.72742 4.43538 43538
117 118 119 120 121 122 123	15.27750 22.21721 20.05603 35.49646 15.57758 22.21721 28.85683	-3.350+2 -3.950+9 -3.950+9 -3.950+9 -5.31235 -5.91233 -5.91233	6.727.62 6.727.82 5.727.52 6.727.52 6.455.38 6.455.38
117 118 119 120 121 122 123	15.27750 22.21721 20.056c3 35.49646 15.57758 22.21721 28.85683 35.49646	-3.350+3 -3.950+9 -3.950+9 -3.950+9 -5.31233 -5.31233 -5.31233 -5.31233	6.727.62 6.727.62 5.727.62 5.727.62 6.435.36 435.36 4.495.38
117 118 119 120 121 122 123 124 125	15.27750 22.21721 20.056c3 35.49646 15.57758 22.21721 28.85683 35.49646 15.57758	-3.350+2 -3.950+9 -3.950+9 -3.950+9 -5.31235 -5.91233 -5.91233	6.727 62 6.727 82 5.727 82 6.727 82 6.435 38 6.495 38 4.495 38
117 118 119 120 121 122 123	15.27750 22.21721 20.056c3 35.49646 15.57758 22.21721 28.85683 35.49646 15.57758	-3,350+3 -3,950+9 -3,950+9 -3,950+9 -5,91233 -5,91233 -5,91233 -5,91233 -6,974;3	6.727 62 6.727 82 5.727 82 6.727 82 6.435 38 6.495 38 4.495 38
117 118 119 120 121 122 123 124 125 126	15.27750 22.21721 20.05646 15.57758 22.21721 28.85683 35.49646 15.57758	-3.350+3 -3.950+9 -3.950+9 -3.950+9 -5.31233 -5.91233 -5.91233 -5.91233 -6.97455 -6.97455	6.727.62 6.727.62 5.727.62 6.727.62 6.49538 6.49538 6.49533 1.57657
117 118 119 120 121 122 123 124 125 126	15.27750 22.21721 20.05643 35.49646 15.57758 22.21721 28.85683 35.49646 15.57756 22.21721 26.85683	-3.350+3 -3.950+9 -3.950+9 -3.350+9 -5.31233 -5.31233 -5.31233 -5.31233 -6.97455 -6.37456	6.727.62 6.727.62 5.727.52 6.727.52 6.45536 4.49536 4.49536 1.57657 1.57657
117 118 119 120 121 122 123 124 125 126 127	15.2775q 22.21721 35.49646 15.5775A 22.21721 28.45633 35.49646 15.57758 22.21721 26.45623 35.49646	-3.350+2 -3.350+9 -3.35049 -3.35044 -5.31233 -5.31233 -5.31233 -6.37433 -6.37434 -6.37436	6.727.62 6.727.62 5.727.62 6.727.62 6.495.38 6.495.38 6.495.38 6.495.35 1.576.57 1.576.57
117 118 119 120 121 122 123 124 125 126 127 128	15.2775a 22.21721 20.05643 25.49646 15.5775a 22.21721 28.85683 35.49646 15.5775a 22.21721 26.85663 35.49646 35.496463 35.496463	-3,350-2 -3,95049 -3,95049 -3,95049 -5,31233 -5,31233 -5,31233 -6,37436 -6,37436 -6,37436 -6,37436 -6,37436 -1,21332	6.727.62 6.727.62 5.727.62 6.727.62 6.49538 6.49638 6.49638 1.57657 1.57657 1.57657 1.57057
117 118 119 120 121 122 123 124 125 126 127	15.2775a 22.21721 20.05643 25.49646 15.5775a 22.21721 28.85683 35.49646 15.5775a 22.21721 26.85663 35.49646 35.496463 35.496463	-3,350-2 -3,95049 -3,95049 -3,95049 -5,31233 -5,31233 -5,31233 -6,37436 -6,37436 -6,37436 -6,37436 -6,37436 -1,21332	6.727.62 6.727.62 5.727.62 6.727.62 6.49538 6.49638 6.49638 1.57657 1.57657 1.57657 1.57057
117 118 119 120 121 122 123 124 125 126 127 128 129	15.2775a 22.21721 36.056c3 35.49646 15.5775a 22.21721 28.85693 35.49646 15.5775a 22.21721 26.656c3 35.49646 39.48652 46.53973	-3,350+3 -3,950+9 -3,950+9 -3,950+9 -5,91233 -5,91233 -6,97405 -6,97405 -1,21352 -1,17,2	6.727.62 6.727.62 5.727.62 6.727.62 6.49538 6.49538 6.49533 1.57657 1.57657 1.57657 1.57657 1.57657
117 118 119 120 121 122 123 124 125 126 127 128 129 133	15.2775a 22.21721 40.05643 35.49646 15.5775a 22.21721 28.85683 35.49646 15.5775a 22.21721 26.85663 35.49646 35.49646 39.48656 39.48656 41.40190	-3,350,2 -3,950,9 -3,950,9 -3,950,9 -5,31233 -5,31233 -5,31233 -6,374,5 -6,374	6.727.62 6.727.62 5.727.62 6.727.62 6.495.38 6.495.35 1.576.97 1.576.97 1.576.97 1.576.97 1.576.97
117 118 119 120 121 122 123 124 125 126 127 128 129 131	15.2775a 22.21721 20.05643 35.49646 15.57758 22.21721 28.85683 35.49646 15.57758 22.21721 26.65663 35.49646 39.48652 40.53973 41.40190 41.76495	-3, 250-2 -3, 95049 -3, 95049 -3, 95049 -5, 91233 -5, 91233 -5, 91233 -6, 97436 -6, 97436 -6, 97436 -6, 97436 -1, 21332 -3, 377, 2 -1, 377, 2 -1, 377, 2	6.727.62 6.727.62 5.727.62 6.727.62 6.495.36 6.495.36 6.495.36 1.576.7 1.576.7 1.576.7 1.576.7 1.576.7 1.576.7 1.976.7 1.976.7 1.976.7 1.976.7
117 118 119 120 121 122 123 124 125 126 127 128 129 131 131	15.2775a 22.21721 26.056c3 35.49646 15.5775a 22.21721 28.85633 35.49646 15.5775a 22.21721 26.656c3 35.496c6 35.496c6 46.53973 41.40190 41.76.495 37.40502	-3, 250+2 -3, 950+9 -3, 950+9 -3, 950+9 -5, 91233 -5, 91233 -6, 97405 -6, 97405 -1, 21332 -1, 1732 -1, 1732 -1, 17340 -1, 21332 -1, 17340 -1, 21332 -1, 21332 -1	6.727.62 6.727.62 5.727.62 6.727.62 6.49538 6.49538 6.49533 1.57657 1.57657 1.57657 1.57657 2.97667 2.97667 2.97667
117 118 119 120 121 122 123 124 125 126 127 128 129 131 132 133	15.2775a 22.21721 20.056c3 35.49646 15.5775a 22.21721 28.85693 35.49646 15.57756 22.21721 26.856c3 35.4966c0 35.4966c0 41.76495 41.40190 41.76495 39.48652 39.48652 39.48652	-3,350+3 -3,950+9 -3,950+9 -3,950+9 -5,91233 -5,91233 -5,91233 -6,97495 -6,97495 -1,21332 -7,72021 -1,7349 -3,45699 -2,45699 -2,45699 -2,45699	6.727.62 6.727.62 5.727.52 6.727.52 6.45538 6.45538 6.45538 6.45538 1.57657
117 118 119 120 121 122 123 124 125 126 127 128 129 131 131	15.2775a 22.21721 26.056c3 35.49646 15.5775a 22.21721 28.85633 35.49646 15.5775a 22.21721 26.656c3 35.496c6 35.496c6 46.53973 41.40190 41.76.495 37.40502	-3, 250+2 -3, 950+9 -3, 950+9 -3, 950+9 -5, 91233 -5, 91233 -6, 97405 -6, 97405 -1, 21332 -1, 1732 -1, 1732 -1, 17340 -1, 21332 -1, 17340 -1, 21332 -1, 21332 -1	6.727.62 6.727.62 5.727.62 6.727.62 6.49538 6.49538 6.49533 1.57657 1.57657 1.57657 1.57657 2.97667 2.97667 2.97667

```
136 41.78495
                         -. += 331
                                          . 3+6 98
       39.48562 -5.17323
                                        3.933-6
138
       40.63575
                       -3.39320
                                        2.30962
139 1.4.191
                      -2.21712
                                        1.56511
                        -.73904
                                          . 56152
141 3.40662
                      -6.1ú231
1+2 40.63578 -4.33874
143 41.40190 -2.51527
144 41.76445 -37175
                                        .95561
                                          .59195
                                         .19/32
       - 30306
1.91528
145
                                        - . 3 12 . 0
                                     -2.976 00
146
                        -.32021
147 4.97972
148 9.57538
                       -.03/02
                                     -4 . 300 DA
                       -1.21352
        1.91526
169
150
151
         9.57638
                                       -5.336 86
153
          . 383: 6
                        -./39:4
                                       -. 351 52
154
        1.91528 -2.21712
                                      -1.68577
       4.97972 -3.39520
3.57533 -5.1732:
155
                                     -2.809t2
156
        1.91520
                      -.3/1/5
                                     -.19732
157
158
159 4.9737.2 -4.35073

160 9.57638 -6.10231 -1.35125

161 15.57758 -1.33723 -7.93630

162 22.21721 -1.35723 -7.93630

163 26.89663 -1.33723 -7.93630

164 35.49646 -1.33723 -7.93630
         4.97972 -4.35873 -.98661
165 15.57753 -3.95049 -5.727 £2
166 22.21721 -3.93049 -5.727 £2
167 28.85563 -3.93049 -6.727 £2
168 35.496-6 -3.95049 -6.727 £2
160 35.496.6 -3.95049 -6.727.62
169 15.57718 -5.91233 -4.49538
170 22.21721 -5.91233 -4.49538
171 23.69663 -5.91233 -4.49535
172 35.496.6 -5.31233 -4.49535
173 15.57718 -6.97-08 -1.57817
                       -6.3/405 -1.57617
174
       22.21/21
                      -5.9/403
                                     -1.578.7
175
       28.85583
176
       35.49040
       39.46552
                       -1.21332
                                      -5.344 30
                        -.15702 -4.96000
-.12021 -2.37600
-.1/34. -.39200
178
       40.63578
179_ 41.-0190
        41.70495
                     -3.-7.65. -5.866.4
-2.-690s --.26-61
-1.-5143 -2.78243
 161
       39.46662
182
       40.03578
       41.40190
163
                                     -3.933*5
                       -- 49311
-- 1/320
-3.00528
       41.7849.
135
      39.4c in 2
       40.03573
                                      -2.00962
136
                       -2.21712
       41.40190
188
        +1.72+95
                       -3.1.231
149
       39.40062
                                      -1.32123
       40.63575
                       --.3: .73
                                        - . 3ec - 1
       41.-0190
                       -2.51527
                        -.37175
                                       -. 197 72
192
       41.784=5
```

THIS PAGE IS BEST QUALITY PRACTICABLE

Nodal 1	Numbe i	ing fo	r Surf	aces
---------	----------------	--------	--------	------

FOR	SURFA	GE	1	
1 2 3 4 5	1 6 7 8 9	1 10 11 12 13	1 14 15 15 17	1 18 19 20 21
FOR	SURFA	CE	2	
5 22 23 24 25	9 25 27 28 29	13 30 31 32 33	17 34 35 36 37	21 38 39 40 41
FOR	SUPFA	CE	3	
25 42 43 44 45	29 45 47 48 45	33 49 90 91 45	37 32 33 54 45	95 98 57 45
FOR	SURFA	CΕ	5	
1	1	1 66	1 70	1 15
58 59 50 61	62 63 64 85	67 58 69	71 72 73	19 20 21
59 50	63 64	67 58 69	71 72	19 20
59 50 61	63 64 85	67 58 69	71 72 73	19 20
59 50 61 FOR 61 74 75 76	63 64 65 SURFA 65 78 79 80 81	67 58 69 62 62 82 83 84 65	71 72 73 6 73 86 37 88	19 20 21 21 33 39 40
59 50 61 FOR 61 74 75 76 77	63 64 65 SURFA 65 78 79 80 81	67 58 69 62 62 82 83 84 65	71 72 73 6 73 86 37 88 39	19 20 21 21 33 39 40

FOR	SURFAC	35	9	
1 2 3 4 5	1 102 103 104 109	1 106 107 108 119	1 110 111 112 113	1 114 115 116 117
FOR	SURFAC	E	10	
5 22 23 24 25	105 118 119 120 121	109 122 123 124 125	113 125 127 125 129	117 130 131 132 133
FOR	SURFAC	E	11	
25 42 43 44	121 134 135 136 45	125 137 138 139 45	129 140 141 142 45	1 33 1 43 1 44 1 + 5
FOR	SURFAC	E	13	
1 58 59 60 61	1 146 147 148 149	1 150 151 152 153	1 154 155 155 157	1 114 115 116 117
FOR	SURFAC	E	14	
61 74 75 76 77	149 158 159 160 161	163 162 183 164 165	157 165 157 158 169	117 130 131 132 133
FOR	SURF AC	E	15	
77 90 91 92 45	151 170 171 172 45	155 173 174 175 45	159 175 177 178 45	1 5 3 1 4 3 1 4 4 1 4 5 5 5

Nodal Numbering for Elements

ELEM	**	+-	-+	
1		23 + 7 6 / 2 9 2 1 1 1 2 1 3 4 1 5 5 1 7 2 2 3 2 5 1 5 1 7 2 2 3 3 1 2 3 3 3 5 3 7 2 3 3 4 4 5 6 7 6 7 6 6 9 7 7 1 2 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	1	. 1
2 3 4 5 5 7 7 0 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23	7	3	1 5 7	2
5	-		7	3
5	10	à	1	1
ì	11	,	1:	ė
1	12	٤	11	7
0	13	9	12	٥
.0	14	13	1	1
11	15	11	14	10
12	17	13	15	12
13	15	_14	1_	1
1.	19	15	13	14
15	20	15	19	15
17	23	22	20	16
18	27	23	25	22
19_	28	24	27	23
20	29	25	25	24
21	30	26	13	9
23	31	20	71	26
24	33	29	32	28
25	34	31	17	13
26	35	31	34	30
27	36_	32	32	31
29	39	76	35	32
30	39	30	33	34
. 31	40	35	31	35
32	-1	37	+3	36
. 33	45	42	23	25
715	4.2	4.5	-0	-2
36	4-	45		44
37	49	_ 46	. 33	29
38	50	47	43	-6
39	51	45	23	47
41	52	40	31	77
42	53	53	52	64
43	54	51	53	
+4	-5	45	3.	= 1
45	5%	- 52	61	37
47	31	53	33	-2
48	45	45	57	54
49	53	62	1	1
50	59	€ 3	53	= 2
51	60	54	59	3
43	61	63	1	-
54	63	67	52	18
_ 55	. 64	-68	53	- 47
24 25 26 27 28 29 30 31 32 33 35 36 37 38 39 40 41 42 45 46 47 46 47 46 47 46 47 46 47 46 47 46 47 46 47 46 47 46 47 46 47 46 47 47 47 48 47 47 47 47 47 47 47 47 47 47 47 47 47	7 7 9 9 10 11 12 13 14 15 15 15 15 15 15 15 15 15 15 15 15 15	-9	1 11 11 11 11 11 11 11 11 11 11 11 11 1	1 2 3 4 4 4 4 1 2 2 3 3 6 3 2 2 3 4 4 4 5 3 6 5 2 2 3 3 6 5 2 3 3 6 5 2 3 3 6 5 2 3 5 6 6 7 7 0 7 1 2 1 1 1 1 1 2 1 2 1 2 1 3 1 2 1 2 1 3 1 2 1 3 1 3
57	- 65	70	1	1
59		72	32	/0
60	63	73	33	72
61	70	18	1	1
50	71	19	70	18
63	72		71	19
04	13	61	12	50

THIS PAGE IS BEST QUALITY PRACTICABLE

65 36	74	7.8	51 74	80 69 21 33 64 37 76 65 77 76 65 77 76 77 77
67	75 75 77 73 79	80	75	
68	77	91	75	80
69	73	32	33	9
70	79	53	73	3.5
11	0:	:4	13	33
73	62	50	33	7.7
7.	83	87	32	9.6
15	c's	36	23	:7
76	15	39	3 -	5.5
77	53	7.3	13	21
70	61 62 63 65 65 65 65 65 65 65 65 65 65 65 65 65	. 1	- 3	3.5
40	A G	-1	99	- 0
c1	90	-3	7-	51
52	71	c.f	2.	93
33	92	2.5	31	2'}
84	-5	45	92	2.7
35	93	96	31	
A7	35	34	3.	4.7
33	45	Li	33	
09	9,		2.5	
90	97	100	96	17
31	99	101	3.	. 100.
32	-0	23	3-	161
96	100	44	49	. 6
95	131	=7	137	
96	4.5	-5	131	1.7
17	2	102	1	1
98	3	1 3	2	1 2
100		103	2	1.3
101	102	103	i	1
132	103	197	112	116
1.3	1.4	113	113	1.7
104	105	109	13%	105
105	100	110	1	- 1
107	107	111	107	110
168	109	113	133	112
1.9	112	114		1
6970123 777777777777777777777777777777777777	111	115	117	114
111	112	116	111	115
112 113 114 115 116 117	22	117	112	116
114	23	113	22	118
115	24	123	23	119
116	25	121	24	120
117	118	122	105	1.09
118	119	123	118	122
119 120 121 122 123 124 125	121	125	120	125
121	122	123	113	113
122	123	127	122	125
123	124	128	123	127
124	125	129	124	128
125	125	1 30	113	117
126	4 5 102 103 1_4 105 107 103 109 110 111 111 112 113 22 23 24 25 118 119 120 121 122 123 124 125 127 125	79 80 81 82 53 54 67 88 87 53 54 55 68 87 55 68 75 68 87 55 68 75 68 75 68 75 68 75 68 75 68 75 68 75 68 75 68 75 68 75 68 75 68 75 68 75	75 75 75 75 75 75 75 75 75 75 75 75 75 7	130
128	129	133	12:	132
	7			-

THIS PAGE IS BEST QUALITY PRACTICABLE.
FROM COPY FURNISHED TO DDC

129 .	42	134	25	121
130	43	1 35	42	134
131_	44	1.35	43	1.35
132	45	45	++	136
133_	134	137	121	125
134	135	138	134	137
135	136	139	135	138
136	45	45	136	139
137_	137	140	125	129
138	138	141	137	1-0
139	139_	142	139	151
140	45	45	139	142
1+1	143	143	121	133
142	141	144	1+6	1-3
143	142	145	141	144
1-4	45	45	1+2	1-1
145	145	t: 8	1	1
140	147	59	140	33
147	140	6.0	1+7	r 3
1-8	1-9	61	1-8	- C
149	150	145	1	1
150	151	147	150	1-0
151	152	143	151	11/
152	153	143	152	150
153	15+	151	1	1
154	155	151	154	1:0
155	15ó	152	155	111
156	157	153	150	1:2
197_	114	154		
158	113	155	114	154
159	115	156	115	155
160	117	157	115	1.6
161	153	74	143	155 176
102	159	75	153	7-
103_	151	75	179	75
164	161	77	130	15
165	162	158	153	1+9
166	163	159	162	155
167	164	150	153	159
108	165	161	10-	1.0
109	_165	162	151	100
170	167	163	155	152
171	16ô	164	157	1:3
172	169	165	153	104
173	130	166	117	157
174	131	167	130	155
175_	132	168	131	155
176	133	169	132	158
177	170	90	151	77
178	171	91	170	90
179	172	92	171	91_
180	45	45	172	92
181	173	173	105	1.1
102	174	171	173	1/0
163	175	172	17-	171
104	45	45	173	1/2
185	175	173	159	165
186	177	174	1/3	1/3
187	173	175	177	175
108	45		173	
189	1-3	175	133	175 149 173
190	144	177		125
191	144		143	177
		178	1	177
192	4:	b.i.	143	111

FROM COPY FURNISHED TO DDC

The Distribution of the Source

FOR SUBSURFAC	E_1		
11944£+34	119435+04	1 1941E+04	11 9405+04
11322£+0+	113175+04	11309E+04	11364=+04
100032+64	999578+03	9982/E+03	9373dE+03
75270E+03	751755+03	750515+03	74969E+03
FOR SUBSURFAC	E 2		
293115+03	295+3E+03	29875E+03	30 0 98E+ 03
41211E+02	415352+02	41983E+C2	42293E+02
.18245E+03	.184565+03	.1A7575+03	. 18 973E+03
.50453E+03	.513935+03	.51987E+03	•52 61 CE+03
FOR SUBSURFAC	E 3		
.106976+04	.13762E+C4	.11.8655+34	.15 648E+C4
.13099£+0+	.131152+0+	.13137E+04	. 131536+04
.14415E+04	.144195+64	.144252+04	.144315+04
-15021E+04	.15 1225+04	.15022E+04	. 15 023E+04
FOR SUBSURFAC	DE 5		
-,11944E+04	114435+64	119-12-0-	11 94 0E+ 04
11322E+04	11317E+04	11369E+u4	11 3u 4E+C4
10005E+0+	99957:+03	99827 =+03	-,93738E+03
75270E+03	75175E+03	75051E+u3	749692+(3

FOR SUBSURFAC	E 6		
29311E+03	295+9E+03	29875E+03	30 1986+03
41211E+02	1535=+02	-,41983E+82	- 4229 35+02
•18245E+03	.13-36E+03	.18757E+03	•18 973E+C3
.50453E+Q3	.510335+03	.51907E+03	.526102+03
FOR SUBSURFAC	E 7		
.10697E+04	-107+2E+04	.108055+04	.103485+04
•13099E • 0+	•13115E+O+	.13137=+0+	. 131 535 + 0 -
.14415E+04	.14+19E+04	.14426E+04	.144315+04
•15021E+04	.150222+0-	.150225+0+	. 150235+04
FOR SUBSURFAC			
11944£+04	113635+04	119415+04	119402+04
11322E+04	11317E+04	-,11309E+0+	11 3045+04
10005E+04	99 9575 +03	99627E+03	997388+03
75270E+03	75175E+03	75 05 1E+03	743095+03
FOR SUBSURFAC	GE 10		Marie Marie M. Res
29311E+03	29549E+03	29875E+03	300985+03
41211E+02	41535E+02	41983E+02	42293E+02
.18245E+03	.15456E+03	.10757E+Q3	.13 973E+03
.50453E+03	.51093E+03	.51987E+03	.52510E+03

FOR SUBSURFAC	E 11		
.1069/E+04	.10742E+04	.1 08 05E+0\$. 10 34 oE+ 04
.13099E+04	.13115E+04	.13137E+04	. 13153E+04
.14415E+04	.14419E+04	.144252+04	.14431E+C
.15021€+04	.150225+04	.15022E+06	. 150235+04
FOR SUBSURFAC	E 13		
119442+04	113435+04	11941E+04	113405+04
11322E+04	113175+04	11309E+04	11 30 4E+ 04
100C5E+Q4	939575+03	49827E+03	93738E+0
75270E+03	75175E+03	75051£+03	74969E+03
FOR SUBSURFAC	E 16		
29311E+03	29549E+03	29875=+03	30 0985+03
M1211E+02		41983E+02	42 2935 ± 02
.18245E+03	.18455E+03	.18757E+03	. 18 97 3E+03
.50453E+03	.51133E+03	.51987E+03	.52 S1 CE+ 03
FOR SUBSURFAC	E 15		
.11697E+G4	.137425+64	.1.8.55+.4	13 4485+24
.13099E+04	.131152+04	.131375+0+	. 131536+04
.14415E+C4	-149195+24	.144265+24	
.15021E+04	.153225+6+	.150223+04	. 15 0 23E + 04

The Distribution of the Velocity Potential

FCR SUBSURFAC	Ε 1		
67872E+03	57879E+03	67892E+03	67 915E+03
64670F+03	66671E+03	646945+03	64760E+03
58307E+03	58329E+03	58396E+03	53536E+03
45087E+03	5151E+03	45303E+03	45560E+03
FOR SUBSURFAC	E 2		
124075+03	127326+03	13424£+03	14102E+03
11810E+02	15937E+02	22830£+02	31 1 3 6E + 02
.78425E+02	.72359E+02	.63175€+02	.51499E+02_
.21893E+G3	.21015E+03	•19549E+03	.17.49E+03
FOR SUBSURFAC	E 3.		
.76572E+03	.75131E+03	.72782E+03	.70411E+03
90453E+03	.89511E+03	.87721E+03	. 85 861E+03
.96299E+03	.95357E+03	•941.15+63	. 92 9145+03
.96505E+03	.96313E+03	95990E+03	. 95 6 21E+03
FOR SUBSURFAC	E 5	143	
68045E+03	68 025E+03	67989E+03	67949E+03
65243E+03	65137E+03	65018£+03	64 8745+63
59367E+03	59226E+03	5A995=+03	58746E+03
46828E+03	45626E+03	46289E+03	45906E+C3

FOR SUBSUPFAC	<u> </u>		
15193E+03	15151E+03	-•14998E+03	14 65 4£ + 0
5k 254E+02	50039E+02	456195+12	33 1 10 E + 0
·18535E+02	.22+24E+02	.29785E+02	.3935025+0
.12757E+03	.13-285+03	.14625 E+03	• 15 1 5 5 E • C
FOR SUBSURFAC	E 7		
.6594dE+03	, å à 3 à 4 ± + 0 3	.67205E+03	.68527E+01
.82571E+03	.82937E+03	.83416E+03	.843985+03
.90704E+03	.909355403	,91303E+03	.91367E+0
•94695E+03	.9+7965+03	.9+991E+03	. 95 27 42 + 0
FOR SUBSURFAC	E 9		
67872E+03	-,57378E+03	67692E+03	67 915E+0
64670E+03	-,646715+03	646946+03	64760E+0
56307E+03	-,58328E+03	58396E+03	58536E+0
45087E+03	-,45151E+03	-,45303E+03	45 56 05+ 0
FOR SUBSURFAC	E 10		
12407E+03	12732E+03	13426E+03	14102E+0
11810E+02	15d37E+02	22630E+02	311366+0
.76425E+02	.72853E+02	.63175E+02	.51 699E+ 0

FOR SUBSURFACE	<u> </u>		
.76572E+03	.751315+03	.72782E+03	.70411£+C3
.90653E+Q3	.89511E+03	.87721E+03	65 361£+03
.96298E+03	.953572+03	.94101E+03	. 92 91 45 + 03
.96503E+03			. 95621E+Q3
FOR SUBSURFAC	E 13		
68045E+03	530255+03	679d>E+03	67 949E+03
65243E+03	651575+03	650162+03	E4 374E+03
59387E+03	532255+83	589955+03	59 746E+03
46828E+03	\$56252+03	462 898+03	45906c+03
FOR SUBSURFAC	E 14		
15193E+03	15151E+03	14998E+03	14 654£+03
52254E+02	3,1335+02	45609E+02	331152+02
·18535E+02	.22+2+5+02	.297855+02	. 39 3505+02
.127572+03	,13429E+[3	.14625E+03	. 161552+03
FOR SUBSURFAC	€ 15		
.85948£+03	.853345+13	.67205E+Q3	.635275+03
.82571£+03	.828375+03	.83416E+03	.843982+03
.947642+03	.42.1352+03	.91303E+03	.913675+03
		.94991E+03	. 95 27 4E+ 03

Pressure Distribution

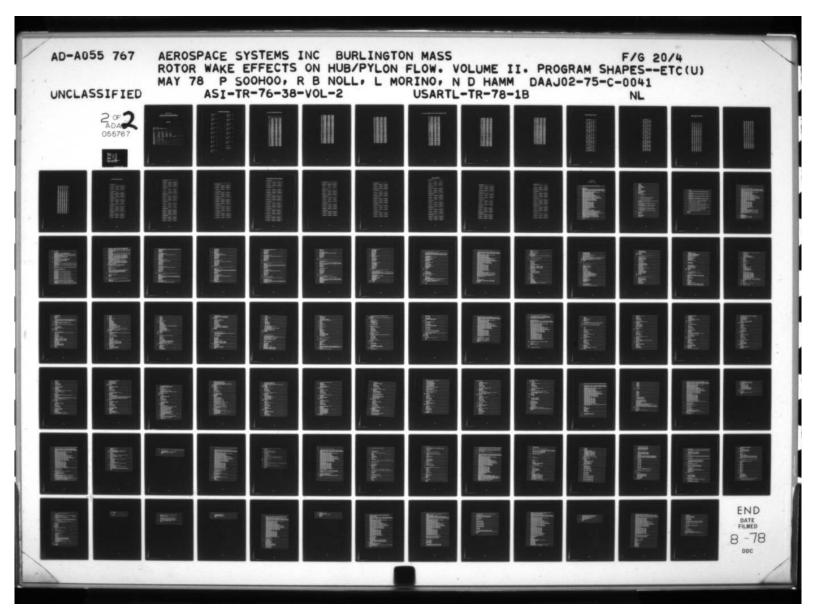
FOR SUBSURFAC	E 1		
.61577E+00	A112735+C1	•11146E+(1	-11 420E+01
.660145+00	106448+00	109915+00	111345+00
17 5 70E+00	17734E+00	17959E+L1	18:45E+CC
32859E+00	32903E+00	328825+00	32753E+00
FOR SUBSURFAC	E 2		
28964E+00	28751E+00	28430E+00	28 07 SE+0 0
13356E+00	132b3E+00	13023F+00	1270 AF+0.0
15172E+00	14859E+00	144135+00	13851E+00
5281E+00	44751E+00	439592+00	43215E+00
FOR SUBSURFAC	E 3		
690562+00	72371E+00	776075+13	80 3265+13
16853E+00	1sə58E+00	211612+00	231235+00
36355E-01	-,456085-01	589115-01	71 302E-01
. 28 68 4 Ē - Q2	.19030E-03	341475-02	678675-02
FOR SUBSURFAC	E 5		
.96689E+00	•10318E+01	•11214E+01	•113 50E+01
94236E-01	989725-01	10516E+00	10 9725+00
16570E+00	163702+00	17483E+03	178705+00
31676E+00	31937=+00	322665+00	325-35+00

EAD	SUBSURFACE	

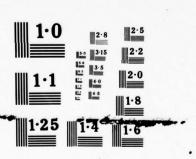
27501F+00	27525E+00	276075+00	27 7 A7F+00
11324E+00	11536E+00	11895E+00	12311E+00
119605+00	12233F+00	12702F+00	13266E+00
423682+00	423355+00	424605+00	427262+00
FOR SUBSURFA	25. 7.		
70167E+00	73-252+00	77709E+00	30 523E+00
208996.00	21340E+00	23233E+00	238176+03
895186-81	72507E-01	7639bE-01	763795-01
11631E-01	11501=-01	10677=-01	937136-02
FOR SURSURFAC	E 9		
.61577E+00	.132 73 E+01	.111365+01	11.820£+01
.56014E+00	10544E+00	109916+00	11134E+00
17570E+00	17754E+00	1 7 959E+00	19 045E+00
32859E+00	32903E+00	32882E+00	327531+00
FOR SUBSURFAC	E 10		
28964E+00	297516+00	28430E+00	25 0756+00
13356E+00	13263E+00	13023E+00	127042+00
15172E+00	143395+00	144135+00	136512+00
45281E+00	447515+00	439595+00	43215=+00

FOR SUBSURFACE 11

75075+00e3±265+00
11015+0023123E+00
911E-0170 362E-01
147E-0267 367E-02
.214E+01 .11630E+01
1516E+001J972E+00
483E+0017070E+00
256F+00 3256 3F+00
6 07 E+00 27 787 E+00
8955+00123115+00
7:25+001325EE+00
7025+0013266E+00 48cE+0042726E+00
48cE+0042726E+00
480E+0042726E+00



2 OF ADA 055767



NATIONAL BUREAU OF STANDARDS

SAMPLE CASE 4:

MODEL 1 HELICOPTER CONFIGURATION WITH ROTOR WAKE AND SEPARATION EFFECTS

Data Input

, 03-2-0-	- 614	GIF	ROTOR	(TWO	RIADE	(2)						
KRE 1D	0	BLL	KOI O.	L1 N.O.	JE4 UE							
#	16	0	0									
**	0	1	1	1	0	0	0	0	1			******
***	0	n			•		•	•	•			
UMACH		047	3600.	000	-0.	000						-
ALFA		000		000		.,						
NBODY		000		000	18.	000	36.	000				
NBOOY		000		000		000		000				
NBOOY		000		000		000		000				
YCORM		450		250		450		910_				
ROTOR		000		040	11.		15.		0.	000	9.000	.12
IHEI75		000	-	000		000		000		000	,,,,,,	• • • • •
RPITCH		000		000								
KBL 1DE	2	1										
NHAKE	1	0	0	1								
SPIRAL	18	3.	000 450	.000								
NPYLON	1	1										
CSIAG	-60	000	1.	000								
KPRINT	1	1	1	1	0	1	1	1	1	1		
NBOJY	3	3	2	1	1							
NBOOY	3	3	1	1	1							
NBODY	3	3	2	1	1							
NROTOR	3	3	2	4	1				Parada value and parada			

Specifications of the Problem

FOR PARI 1 FOR PARI 13 NX = 3NX= 3 NY= 3 NY= 3 FCP PARI 2 FOR PARI 14 NX= 3 NX = 3NY= 3 NY= 3 FOR PARI 3 FOR PART 15 NX= 3 NX= 3 NY= 3 NY= 3 FOR PART 5 FOR PART 24 NX= 3 NX = 3 NY= 3 NY = 3 FOR FARI 6 FOR PART 25 NX= 3 NX= 3 NY= 3 NY= 3 FOP PARI 7 FOR PART 27 NX= 3 NX = 3 NY = 3NY= 3 EOR PART 9 FO9 PART 28 NX= 3 NX= 3 NY= 3 NY= 3 FOR PART 10 NEL = 4 = 144 NX= 3 NY = 3 KSY'MY = 0 KSY 14 Z= 0 FOR PARI 11 NX= 3

NY= 3

X, Y, and Z Coordinates of the Nodes

NODE -	x	Υ	Z
1	3.00000	0.00000	0.00000
2	1.30000	00000	1.08333
3	4.00000	00007	2.16667
4	9.00000	.00000	3.25000
5	1.00000	.24167	.93319
6	4.30000	.48337	1.87539
	7.00000	.72500	2.81458
8	1.00000	. 41858	.54167
9	4.00000	.63716	1.08333
10	9.00000	1.25574	1.62500
-11	1.00080	.48333	00000
12	4.00000	. 96667	00000
14	3.00000	0000	3.13333
15	12.00000	00000	3.01667
16	13.00000	.08000	2.90000
17	12.00000	. 72500	2.71355
18	15.00000	.72500	2.61251
. 19	15.00000	.72500	2.51147
20	12.00000	1.25574	1.56667
. 21	15.00000	1.25574	1.50833
55	15.00000	1.25574	1.45008
23	12.00000	1.45800	00000
24	15.00000	1.45000	00000
25	18.00000	1.45000	00080
26	25.00000	00080	1.93333
27	34.00000	00000	.96667
28	36.00000	0.00000	0.00000
29	28.00000	. 48333	1.67432
30	34.00000	.24167	.83716
31	23,00000	.83715	. 96667
32	34.00000	.41858	.48333
33	25.00000	.96667	00000
34	34.00000	.48333	30000
35	1.70000	00000	-1.08333
36	4.00000	00000	-2.16667
37	9.00000	.00000	-3.25000
38	1.00000	.24167	93819
39	4.00000	.46333	-1.67639
40	9.10000	.72500	-2.81458
41	1.00000	.41858	54167
45	4.30000	.33716	-1.06333
43	7.00000	1.25574	-1.62500
44	12.00000	00000	-3.13333
45	15.00000	00000	-3.01667
+6	18.00000	.00000	-2.90000
47	12.00000	.72507	-2.71355
48	15.00000	. 72500	-2.61251

1 000

49	15.00000	.72500	-2.51147
50	12.00000	1.25574	-1.56667
- 51	15.00000	1.25574	-1.50833
52	19.00000	1.25574	-1.45000
53	25.00000	90000	-1.93333
54	34.00000	00000	96667
55	23.20000	.48333	-1.67432
56	34.00000	.24167	83716
57	23.00000	.83716	96667
58	34.00000	.41858	48333
39	1.00000	24167	.93819
60	4.00000	48333	1.87639
51	3.00048	72500	2.81458
52	1.00000	41858	.54167
_ 63	4.00000	93716	1.08333
54	9.00000	-1.25574	1.62500
. 65	1.00000	48333	00000
66	4.00000	96667	00000
67	9.10000	-1.45000	00000
5.6	12.00000	72500	2.71355
- 69	15.00000	72500	2.61251
70	18.00000	72500	2.51147
71	12.00000	-1.25574	1.56667
72	15.00080	-1.25574	1.50833
73	13.00000	-1.25574	1.45000
74	12.00000	-1.45000	00000
75	15.00000	-1.45000	20000
75	13.00000	-1.45000	00000
77	25.00000	48333	1.67432
78	34.00000	24167	.83716
79	23.20000	33716	36667
80	34.00000	41858	.48333
- 31	23.00000	96667	40000
62	34.)0000	48333	00000
4.3	1.00000	24167	93A19
34			-1.87639
	4. 30080	48333	
45	3.00000	72500	-2.41654
86	1.00000	41858	54167
- 17	4.00000	A3716	-1.08333
56	9.00000	-1.25574	-1.62500
99_	12.00000	72500	-2.71355
90	15.00000	72500	-2.61251
	13.00000	72500	-2.51147
35	12.00000	-1.25574	-1.56667
-93	15.00000	-1.25574	-1.50833
34	13.00000	-1.25574	-1.45000
95	25-00000	6A333	-1.67432
76	84.00000	24167	83716
97	29.00000	83716	96667

99	74.00000	41858	48333
99	11.55000	3.75000	6.67000
100	11.93889	3.75000	6.70462
101	13-10556	3.75000	6.75642
102	15.05000	3.75000	6.67000
103	11.55000	12.77778	6.67000
104	11.33889	12.77778	6.70462
105	13.10556	12.77778	6.75642
136	15.05000	12.77778	6.67000
107	11.55000	18-19666	6.67000
103	11.93889	18.19444	6.70462
109	13-10556	18.19444	6.75642
110	15.05000	18.19444	6.67000
111	11.35000	20.00000	6.67000
112	11.+3889	20.00000	6.67000
113	13-10556	29.00000	6.67000
114	15.05000	20.00000	6.67000
115	11.93889	3.75000	6.63538
116	13.10556	3.75000	6.58358
117	11.93889	12.77778	6.63538
110	13.18556	12.77778	6.58358
119	11.93889	18. 1944	6.63538
120	13.10556	18.19444	6.58358
121	-11.55000	-3.75000	6.67000
122	-11.93889	-3.75000	6.70462
123	-13-10556	-3.75880	6.75642
124	-15.05000	-3.75000	6.67000
125	-11.55080	-12.77778	6.67000
126	-11.93889	-12.77778	6.70462
127	-13-10556	-12.77778	6.75642
128	-15.05000	-12-77778	6.67800
129	-11.35000	-18.19444	6.67000
130	-11.33889	-18.19444	6.70462
131	-13-10556	-18.19444	6.75642
132	-15.05000	-18.19444	6.67000
133	-11.55000	-20.00000	6.67000
134	-11.33889	-20.00000	6.67000
135	-13-10556	-20.00000	6.67000
136	-15.05000	-28.00000	6.67000
137	-11.33889	-3.75000	6.63538
178	-13-10556	-3.75000	6.58358
139	-11,93689	-12.77778	6.63538
140	-13.10556	-12.77778	6.58358
141	-11.93889	-16.19445	6.63538
142	-13.10556	-18.19444	6.58358

X, Y, and Z Coordinates of the Centroid of Aerodynamic Panels

	XPC	YPC	zec
ELEM=	50.055	.06042	.50538
2	2.51277	.18125	1.51615
3	6.50719	. 30208	2. 52591
•	.50055	.16506	. 36997
5	2.20277	. 49518	1.10990
6.	6.51719	.82531	1.84983
7	.50855	.22548	.13542
8	2 33277	. 67643	. 40625
9	6.50719	1.12739	.67708
	10.51162	.36250	2.97787
	3.51634	.36250	2.86901
	16.51825	. 36250	2.76016
13	10.51162	.99037	2.17995
14	13.51494	.99037	2.10026
15	16.51825	.99037	2.02058
16	1 0.51162	1.35287	.79792
17	3.51494	1.35287	. 76 879
	16.11825	1.35287	.73950
	23.02545	. 30208	2.25478
	1.03430	. 18125	1.35287
	15.14 872	. 06 842	45 096
	23.02 45	.82531	1.65061
	31.03430	49518	.99037
	35.13872	.16506	.33012
	23.02545	1.12739	.60417
	31.05430	. 67643	. 36250
	5.04872	.22548	.12083
28	.53055	.06042	50 538
29	2.20277	.18125	-1.51615
30			
	6.50719	. 30208	-2.52691
31	50155	.16586	36 997
32	2.>0277	.49518	-1.10990
33	6.50 719	42531	-1.66463
34	.50 055	.22548	13542
35	2 50277	67643	40625
36	6.58719	1.12739	67708
	19.51162	36250	-2.97787
	13.>1494	.36250	-2.86901
	16.21825	. 36250	-2.76016
	10.51162	.99037	-2.17995
41	13 51696	99037	-2.10025
	16.21925	.99037	-2.02058
43	10.51162	1.35287	79792
44	13.51 494	1.35297	76875
45	16.51825	1.35247	7395A
46	23.02545	.30208	-2.25478
	31.13630	.14125	-1.35287
	35.05872	.06042	45096
-	23.02545	.82531	-1.65061

50	31.03430	. 49518	99037
-51	35.03872	16506	33012
52	23.02545	1.12739	60 417
53	31.03430	67663	36250
54	35.03 372	.22548	12083
55	-50055	06042	-50538
56	2.50 277	18125	1.51615
57	6.54719	30208	2.52691
58	.50855	16506	. 36997
59	2.50277	49518	1.10990
60	6.50719	82531	1.84983
61	- 50055	22568	.13562
62		67643	.40625
63	6.14719	-1-12739	-67708
64	10.51162	36250	2.97787
65	13-21'494	36258	2.86901
66	16.51825	36250	2.76016
67	10.51162	99037	2.17995
68	13 51494	99037	2.10025
69	16.51 825	99837	2.02058
70	10.51162	-1.35297	.79792
71	13.11994	-1.35287	75.875
72	16.51825	-1.35297	.73958
73	23.02545	3020A	2.25478
76	31.13430	18125	1.35287
75	35.13872	06042	45096
76	23.02545	82531	1.65061
77	31 13430	49518	99037
75	35.13872	16506	. 33 012
79	23.02545	-1-12739	60 417
87	31.03430	67643	. 36250
81	35.13872	2254A	12083
82	.50855	06042	50538
83	2.50277	18125	-1.51515
54	6.50 719	30208	-2.52691
_85	-50855	16506	36997
86	2.20277	49518	-1.10990
87	6.34713	A2531	-1.84983
88	.50055	22548	13542
30	2.50277	67643	40625
90	6.50719	-1.12739	67708
	18.51162	36250	-2.977A7
92	13.51494	36250	-2.86901
_33	16.51.825	36250	-2.76016
94	10.51162	99037	-2.17995
-95	13 51494	- 99037	-2.18025
96	16.51825	99037	-2.02058
	10.51162	-1.35287	79792
96	13.51494	-1.35297	76875

49 16.11925 -	1. 35247	73358
100 23.12545	30208	-2.25475
101 31-15630	18125	-1.35287
	05042	45 096
	82531	-1.65061
	49518	99037
	16506	33012
	1.12739	60 417
	67643	36250
	22548	12 083
109 . 11.75744	8.26389	6.58731
110 12.53608	8.26389	6.73052
111 14.19335	8.26389	6.71321
112 11.75744 1	5.48611	6.68731
113 12.54608 1	5. 48611	6. 73052
114 14.09335 1	5.48611	6.71321
	9.09722	6.67866
	9.09722	6.70026
	9.09722	6. 69161
	8.26389	6.65269
	8.26389	6.6036A
	8.26389	6.62679
	5.48611	6.65269
	5.48611	6. 50 948
	5.48611	6.62679
124 11.75744 1	9.09722	6.66134
125 12.53608 1	9.49722	6.63974
126 14.19335 1	9.09722	6. 64839
127 -11.75766 -	4.26389	6.68731
	8.25389	6.73052
	1.26389	6. 71 321
	5.48611	6.58731
	5. 48611	6. 73 052
	5.48611	6.71321
	9.09722	6. 67866
	9.09722	6.70026
	9.09722	6. 69161
	8.26389	6.65269
	1.26389	6.60948
	8.26359	6.62679
	5.48611	6.65269
140 -12 53608 -1	5.48611	6.60945
141 -14.09 335 -1	5.44611	6.62679
142 -11.75744 -1	9.09722	6.66134
143 -12.53608 -1	9.09722	6.63974
144 -14.49335 -1	9.09722	6. 64839

Nodal Numbering for Surfaces

FOR	31.9FA	C.E.	
1	1		
2	5	8	11
•	7	10	13
FOR	SURFA	UE	2
4	7	10	13
15	17	21	23
16	18	22	25
FOR	SAFE	C.E	3
15	19	22	25
25	29	31	33
27	28	28	28
	SURFA		5
1	1	1	1
35	38	41	11
35	19	42	12
FOR	SURFA	CE	6
FOR			13
37	SURFA		
37	40	43 50 51	13 23 24
37 44 45	47	43 50	13
37 44 45 46	47	43 50 51 52	13 23 24
37 44 45 46 *DR	47 48 49 53 FA	43 50 51 52 GE	13 23 24 25 7
37 44 45 46 FOR 45	47 48 49 50 FA	43 50 51 52 52 57	13 23 24 25 7 25 33
37 44 45 46 FOR 45 53	47 48 49 53 FA	43 50 51 52 GE	13 23 24 25 7
37 44 45 46 57 53 54	48 47 48 49 50 RFA 49 55 56	53 50 51 52 52 57 58 28	13 23 24 25 7 25 33 34 28
37 44 45 46 57 53 54	47 48 49 50 RFA 49 55 56 28	43 50 51 52 6E 52 57 58 2A	13 23 24 25 7 25 33 34 28
37 44 45 46 57 53 54 23	48 47 48 49 55 56 28 51RFA	43 50 51 52 6E 52 57 58 28	13 23 24 25 7 25 33 34 28
37 44 45 46 67 87 87 87 87 87 87 87 87 87 87 87 87 87	48 47 48 49 55 56 28 SIRFA	43 50 51 52 52 57 58 24 GE	13 23 24 25 7 25 33 34 28 9
37 44 45 46 53 54 23 FOR	48 47 48 49 55 56 28 51RFA	43 50 51 52 52 57 58 28 62 63 64	13 23 24 25 7 25 33 34 28 9
37 44 45 46 60 60 83 54 21 60 80 80 80 80 80 80 80 80 80 80 80 80 80	48 47 48 49 55 56 28 SIRFA	\$3 50 51 52 65 57 58 24 62 63 64	13 23 24 25 7 25 33 34 28 9
37 44 45 46 60 60 83 54 21 60 80 80 80 80 80 80 80 80 80 80 80 80 80	48 47 48 49 55 56 28 51RFA 1 59 61 50RFA	\$3 50 51 52 GE 52 57 58 28 GE 1 62 63 64 GE	13 23 24 25 7 25 33 34 28 9 1 65 66 67
37 44 45 46 60 60 83 54 21 60 80 80 80 80 80 80 80 80 80 80 80 80 80	48 47 48 49 SUFFA 55 56 28 SURFA 61 SURFA	\$3 50 51 52 65 57 58 24 62 63 64	13 23 24 25 7 25 33 34 28 9

FOR	SURFA	GE	11
15	10	13	76
26	77	79	81
27	78	- 44	82
28	28	28	28
FOR	SUFF	CE	13
1	1	1	1
	13		65
36	54	AA	66
FOR	SURF	CE	14
37	95	. 88	67
44	49	92	74
45	9.0	93	75
46	91	94	76
FOR	SURF	CE	15
46	91	94	76
53	35	97	81
28	96	98	82
FOR	SJRF	CE	26
99	103	107	111
103	104	108	
101	185	119	113
102	106	110	114
FOR	SURF	NGE	25
39	107	107	111
115	117	119	112
102	106		115
FO	SURF	AGE.	27
121	125	129	133
122	126	130	134
123	127	131	135
124	128	132	
FOR	SURF	ACE	28
121	125	129	133
137	139	141	134
138	149	142	135

Nodal Numbering for Elements

ELEY	••	+-	-+	
_1	5	2		1
2	6	3	5	2
3		- 4	6	3
4		5	1	1
5_	9	6		5
6	10	7	9	6
	11	-	_1_	1_
8	15	9	11	
9	13	_11	_12_	9
10	17	14	7	•
	18	15	17	14
12	19	16	18	15
		17	_11_	
14	21	10	50	17
15	22_		21_	_18
16	52	20	13	10
17	26	21	23	_20
18	25	22	24	21
19	29_	26	19	15_
20	38	27	29	26
21	28	28	30	
55	31	29	22	19
23	32	30	31	29
24	58	28	35	30
25	33		25	22
26	34	32	33	31
	20_	38	1	1
29	35	39	35	38
30	36	40	36	39
31	38 -	- 11	1	1
32	39	42	38	41
	41	43	39	42
74	41	11	1	1
35	42	12	41	11
36	43	13	42	12
37	44	47	37	40
33	45	48	44	47
33	46	49	45	48
40	47	50	40	43
41		51	47	50
42	49	52	48	51
43	50	23	43	13_
44	51	24	50	23
45	52	25	51	24
46	58	55	46	49
	- 54	56	53	55
48	28	28	54	56
	-			

- 64	55	57	49	52
50	56	56	55	57
- 51	24	28	56	58
52	57	33	52	25
53	54	34	57	33
58	28	28	58	34
55	2	59	1	i
	3	60	2	59
56	-	61	1	60
57_				
58	59	62	1	1
59_	_60	63	59	_62
50	61	64	60	63
61	52	65_		
62	63	66	62	65
63	54	67	63	66
64	14	68		61
65	15	69	14	68
66	16	70	15	69
67	68	71	61	56
68	69	72	58	71
63	70_	73	69	72
70	71	74	64	67
_ 71	12	75	71	74
72	73	76	72	75
73	26	77	16	7.0
76	27	78	25	77
-	24	24	27	78
75		79	70	73
76	17		77	79
	78	_ AD		80
79	28	28	78	
79	79	_A1_	73	7.5
80	5 0	95	79	11
81	_24_	28	30	
52	53	35	1	1
83	_54_	36	83	35
84	55	37	84	36
AS	_86_	_11_		- 1
86	57	84	86	83
_ AZ	48	45	AZ	
88	65	86	1	1
	-36	AZ	65	46
90	57	88	66	87
91		44	AS	37
	30	45	89	46
92	41	46	99	45
				85
94	92	89	88	
- 95	43		32	19
96	94	91	93	90

97	- 11	92	67		
98	15	93	74	92	
19	16	94	75	93	
100	75	53	91	46	
101	16	54	95	53	
10?	58	28	96	54	
103	97	95	94	91	
104	98	96	97	95	
105	28	28	9.8	96	
106	81	97	76	94	
107	82	98	81	97	
106	28	28	45	#8	
189	106	100	103	39	
110	105	101	104	100	
111	105	102	105	101	
112	108	104	107	103	
113	119	185	104	104	
115	110	106	109	105	
116		108	111	107	
117	113	109	112	108	
118	115	117	99	103	
119	116	118	115	117	
120	102	106	116	118	
121	117	119	103	107	
122	118	120	117	119	
123	186	110	118	120	
124	119	112	107	111	
125	128	113	119	112	
126	110	114	120	113	-
127	126	122	125	121	
128	127	123	126	122	
129	128	126	127	123	
130	138	126	129	125	
131	131	127	130	126	
13?	132	128	131	127	
_133	135	130	133	129	
134	135	131	134	130	
135	1.38	132	135	131	
136	137	139	121	125	
1.37	138	160	137	139	
138	12 4	128	138	140	
139	139	141	125	129	
140	148	142	139	141	
161	128	132	140	142	
142	141	134	129	133	
143	162	135	141	134	
144	132	136	142	135	

The Distribution of the Source

DA SUBSURFAC	E 1	
89/355+02	89462E+02	891315+02
84927E+02	84701E+02	845952+02
. 74571E+02	7 4839E+02	74282E+02
OR SUBSURFAC	E 2	3 (4 5.2) (47
47558E+02	49261E+92	- 48983E+02
. 2758 8E+02	2A720E+02	30053E+02
11U36E+02	11957E+02	14521E+02
FOR SUBSURFAC	E 3	A31,634,715
. 7563 9E+01	.69589E+01	.54540E+01
.13454E+02	.13474E+02	.12740E+02
.165075+02	.16315E+02	.15939E+02
OR JUSTINE	E 5	
- 895362+02	8 9490E+02	89141E+82
. 84/23E+02	84573E+02	84537E+02
72623E+02	72787E+02	73400E+02
OP SUSSURFAC	E 6	25,784612
. 4265 ZE+0 Z	44604E+02	47102E+02
291125+02	29856E+82	3044×E+02
· 1834 2E+02	17929E+02	16805E+02

FOR SURFACE	E 7	
. 1079 46+01	.20296E+01	.35994E+01
_10713F+02	.11148E+02	.11893E+02
. 159 77E+02	.15562E+02	.15663E+02
FOR SUBSURFAC	E_9	
39783E+02	89429E+02	89083E+02
546 55E+12	84210E+02	84007E+02
73652E+02	724978+02	71870E+02
FOR SUBSURFAC	E 10	
46054E+02	46123E+02	46406E+02
277315+02	29056E+02	-,30431E+02
123675+02	14895E+02	17301E+02
FOR SUBSURFAC	E 11	
.706125+01	.56619E+01	.385155+01
-13/99E+92	.13237E+02	.12415E+02
. 16>38E+02	.16263E+02	. 15865 - 02
FOR SUBSURFAC	E 13	
89525€+02	89462E+82	89100E+02
846225+02	84266E+02	84043E+02
72382E+02	71951E+02	71744E+02
FOR SUBSURFAC	E 10	
+55+ SE+0S	44103E+02	457552+02
29117E+02	-,301356+02	30 447E+02
18/08E+02	1904ZE+0Z	18739E+02

.742445+00	.10670E+01	. 21 658E+01
.10517E+92	.10890E+Q2	.11551E+02
.155>65+02	.15506E+02	.15565E+02
FOR SUBSURFAC	E 24	
- 787555+03	70861E+03	62415E+03
261 31 F+03	68756E+03	61629E+03
.234802403	.48777E+03	42148E+02
FOR SURSURFAC	E 25	
38/565+03	70861E+03	62415E+03
261 \$3E+03	~.48756E+03	61628E+03
. 234795+03	.40777E+03	42148E+02
FOR SUBSURFAC	E 27	
37585E+03	69827E+03	61925E+03
2551 2E+03	68164E+03	61 353 5 + 03
.22597E+03	.39747E+13	48 037 E+02
FOR SUBSURFAC	E 28	
37646E+03	69628E+03	61925E+03
2551 3E+0.3	48144E+03	61353E+03
	.39747E+03	

The Distribution of the Velocity Potential

FOR SUBSURFACE 1		
-, 4605 95+02	45837E+02	45642E+02
-, 43104E+02 -,	43535E+02	-,43832E+02
- 38208E+02	39314E+02	39935E+02
FOR SUBSURFACE 2	21789814	
20751E+02	.23836E+02	25505E+02
- 946525481 -	11712E+02	15051F+02
.594/9E+01	5 6 2 0 2 E + 0 1	.196655+01
FOR SURSURFACE		1500.00
- 108165+03	10755E+03	81939E+82
501/2E+03 -	3526AF+83	-,23162F+03
28/12E+03 -	.26470E+03	23479E+03
FOR SURSURFACE	111221000	1012075
46449=+32 -	.4613E+02	45735E+02
4454 9F+12	.44330F+02	44107F+02
4036 3E+02 -	.40151E+02	40 099E+ 02
FOR SUBSURFACE	s and reason	300000000000000000000000000000000000000
24328E+02 -	.25525E+02	25893E+02
-, 20#42E+02 -	.20185E+02	18347F+02
175/3E+02 -	.14880E+02	10502E+02
FOR SURFACE	2	
460175+02 -	.51944E+82	60 3325+05
11458F+03 -	.12857F+83	166355+83
17b39E+03 -	.18723E+03	20720E+03

FOR SURFACE	<u> </u>	
46016E+02	45697E+02	4545\E+02
- 62911 9E+02	62573E+82	-, 42661F+02
365/25+02	35876E+02	36314E+02
FOR SUBSURFACE	<u> </u>	
- 185575+02	19743E+02	- 22044E+02
96158E+01	12030E+02	15413E+02
.41598E+01	.20712E+01	17663E+01
FOR SUBSURFA	E 11	
103 3 9 E + 0 3	10960E+03	84478E+02
50095E+13	35293E+03	23245E+03
2871 55+03	26507E+03	23491 E+ 03
FOR SUBSURFA	E 13	
46401E+02	45972E+02	45552E+02
44297E+92	43636E+02	-, 43 068E+02
39852E+02	38630E+02	37418E+02
FOR SUBSURFA	E 14	
246A1E+02	24636E+02	23897E+02
-, 2104 BE+0 2	-,20633E+02	18778E+0?
- 185265+02	16667E+92	13421E+02

FOR SURSURFAC	E 15	
465365+02	53579E+02	62687E+02
- 11372E+03	12969E+83	~.16475E+03
17643E+03	16733E+03	20732E+03
FOR SUBSURFAC	E 24	
1990¶E+03	36608E+03	31439E+03
137395+03	26042E+03	31464E+ 03
.13121E+03	.22146E+03	16031E+02
FOR SURFAC	E 25	\$200 MUBBLE 1,302
- 201916+03	36731E+03	31523E+03
14058E+03	26242F+83	31620E+03
.12759E+03	•21921E+03	17550E+02
FOR SURSURFAC	E 27	a la trade da Line. Re
19701E+J 3	36264E+03	31327E+03
1384 8E+93	25951E+03	31511E+03
.11989E+03	.21306E+03	21 094E+02
FOR SUBSURFAC	E 28	(ANDERSON E
197255+03	36250E+03	31 340 E+03
1385 AE+0 3	25976E+03	31532E+03
·11955E+03	.21280E+03	21302E+02

Pressure Distribution

FOR SUBSURFACE	1	
. 1009 3E+)1	.12431E+01	.13869E+01
.47196E+00	37578E-01	- 357025-01
753735-01	71196E-01	69669E-01
FOR SUBSURFACE	2	
- 17921=+00	17405F+ 00	- 15750E+00
1685 8 E+0 0	18174E+00	15948E+00
6271 6E+00	.56760E+00	-43089F+00
FOR SUBSURFACE	3	
.91496E+08	.75819E+88	.48350E+00
.73212E+00	.86923E+00	•57373E+88
- 155815+01	89266E-01	157285+00
FOR SUBSURFACE	5	
		*13879E+01
	.12525E+01	
. 925.55E+0.0	.12525E+01 38367E-01	36135E-01
- 35608E-01	.12525E+01 38367E-01 70751E-01	36135E-01
- 3560 8E-01 - 3560 8E-01 70616E-01	.12525E+01 38367E-01 70751E-01	36135E-01
- 3560 8E-01 - 3560 8E-01 70616E-01	.12525E+01 38367E-01 70751E-01	36135E-01
- 35608E-01 - 35608E-0170636E-01 FOR SUBSURFACE 12449E+08	.12525E+01 38367E-01 70751E-01 6	36135E-01 69486E-01 13995E+08
- 35608E-01 - 35608E-0170636E-01 FOR SUBSURFACE 12349E+0848501E-01	.12525E+0138367E-0170751E-03 612867E+0068291E-01	36135E-01 69486E-01 1399bE+08 10846E+00
- 35608E-01 - 35608E-01 70636E-01 FOR SUBSURFACE 12350E+00	.12525E+0138367E-0170751E-03 612867E+0068291E-01	36135E-01 69486E-01 1399bE+08 10846E+00
- 35608E-01 - 35608E-01 - 78636E-01 FOR SUBSURFACE - 12349E+08 - 48501E-01 - 17148E+00	.12525E+0138367E-0170751E-01 612867E+0068291E-01 .207hhE+00	36135E-01 69486E-01 13995E+08 10866E+00

FOR SUBSURFACE	9	12170011
.17926E+01	.12271E+01	.13663E+0
. 4573 ME+00	59901E-01	55051E-01
89529E-01	03759E-01	- 773125-01
FOR SUBSURFACE	10	5801112
168935+00	15273E+00	13413E+00
-, 14,385+00	13943E+70	- 116485+00
.52453E+00	.57705E+00	.44364E+01
FOR SJ9SURFACE	11	
.91+96E+00	.75143E+00	.477935+00
.72//2E+00	.86170E+00	.56648E+00
156145+01	.81257E-01	.15053E+00
FOR SUBSURFACE	13	TOWERS
.914955+08	.12334E+01	.13684E+01
4411 BE-01	52030E-01	52563E-01
- 741415-01	75231E-01	- 74709E-01
FOR SUBSURFACE	14	i i i i i i i i i i i i i i i i i i i
118/9E+88	11590E+00	12045E+00
- 43102E-01	40677E-01	77182E-01
. 17265E+88	.21433E+00	.38114E+80

FOR SUBSURFAC	E 15	
. 18181E+00	.2074E+00	.29630E+00
.37629E+00	.33818E+00	.39679E+00
.11291E+01	.72403E+90	.38526E+00
FOR SUBSURFAC	E 24	
2455 9E+03	41692E+03	15643E+03
40284E+u3	87239E+03	90483E+03
17987E+03	47176E+03	66969E+03
FOR SUSSURFAC	E 25	
23212F+03	39809F+03	14613F+03
40121E+03	06989E+83	90090E+03
1835 Œ+03	47636E+03	670195+03
FOR SUBSURFAC	E 27	
22548F+R3	39161E+03	14203E+03
- 37/325+03	83780E+03	- 875575+03
16+082+93	6553AE+03	653405+03
FOR SUBSURFAC	E 28	ryy Anger 1
- 224925+13	38923=+03	140615+03
37/2 ME+0 3	83759E+n3	875045+03
16964F+03	45653E+03	65346E+03

SECTION 6

PROGRAM LISTING

c	PROGRAM MAIN(IMPUT, GUTPUT, TAPES=IMPUT, TAPE6=GUTPUT)
C	
	MQ (MAY)=XA
C	NELEH (MAX) =400
	NACE (MAX) = 35 d
Made	COMMON/ZZZ1/NX(34),NY(34),NXY(34),KSY4MY,KSYMMZ,NSYMHY,NSYMHZ
	COMMON/ZZZZZNPYLON, NBODY LI, NBODYZ, NBODYZ, NYTAZL, NSHAFT, NHUB, NSHANK
	COMMON/ZZZA/UMACH. DMEGA ALFA, ABETA, AREA
	CONNOW/7775/YPYCTP, YPYCT2, 7PYCTP, BYDYI , BYDYI , BYDYI
	COMMON/ZZZ6/XNOSE,X8D1,4302,XTAIL
	COMMON/2727/YNOSE YROL YROZ YTATL
	COMMON/ZZZ8/ZNOSE, ZBD1,79D2,ZTATL
	COMMON/7779/24801, R7801, 27802, R7802
	COMMON/ZZZ18/RSHAFT, LSHAFT, RSHANK, LSHANK
	COMMON/27711/YHUSCR, YHUSCR, ZHUSCR, ZYHUS, RYHUS, RYHUS
	COMMON/ZZZ12/RROTOR, BCHO QD, TAUBL, AL FAS
	COMMON/222127 RRUTUR, BCH/QD, THOOLS ALFA S COMMON/222137 THETTS, THETTSC, THETTSC, CONTING, AZINUTH
	COHHON/ZZZ14/KBLADE, TANLEB, TANTEB, XBLE, XBTE, KROTORS (34)
	COMMON/77715/ VSPAN, YLEZY, XTEZY, TANLEY, TANTEY, TAU, ZYTAIL
	COMMON/ZZZ16/NWAKPY, NWAK18, NWAKSK, NWAKSL
	COMMON/77717/MAMI DY, MAK 48, MAKI SK, MAK! SK
	COMMON/ZZZ18/WANGPY, WANG18, WANGSK, HANGBL
	COMMON/22719/KPRINT(10), 4READ, NWRITE, KREAD
	COMMON/ZZZZO/PI
	COHMON/ZZZ21/KPY1,KPY2
	COMMON/ZZZ22/KNSELE, KNSS 1P, KNSTYP
	COMMON / 27723 / KROEL E, KROS 49, KROTYP
	COMMON/ZZZZ4/KTNELE, KTNF-1P, KTNTYP
	COMMON/777 25/KPYFLE, KPY5-1P, KPYTYP
	COMMON/ZZZZ6/KYTELE, KYTS 1P, KYTTYP
	COMMON / 277.27/ KSHELE . KSHSHB . KSHTYB
	COMMON/ZZZ28/KHBELE, KHBSHP, KHBTYP
	COMMON/777 29/KSKEL F. KSKS 48. KSKTVB
	COMMON/ZZZ30/KBLELE, KBLS 1P, KBLTYP
	COMION 77731 MSTAG , NYORT , MSP TRAL , SP TRAL
	COMMON/ZZZ32/CSTAG.CVORT
	COMMON/27233/UNAKE
	COMMON/ZZZ34/YCUT
	COMMON / 77788 / ETHIST, RRITCH, THIST
	COMMON/ZZZSO/XCTR,YCTR,! CTR,RX,RY,RZ
	COMMON/ZZZEL/HSPAN, YLEZH, YTEZH, TANLEH, TANTEH, TAUH, ZP
	DIMENSION VELY(250), VELY(250), PMI3(250), KROTOR(250)
	DIMENSION CP4258), VELX (23.8), GG(2), AVG (28.8)
	DIMENSION PC(3,250), P1(3,250), P2(3,250), P3(3,250), KK(3,250)
	DINE METON KMAKE (250) , MOT (4, 250) , MOFCT (49, 34)
	DIMENSION PHIC (250), PHIL (250), PHIZ (250), BC (250)
	DIMENSION AA(A2588), SOIL SE(258), SOE (258)
	EQUIVALENCE (AA(1),PHIG(1)),(AA(481),PHI1(1))
	EQUITY ALENCE (AA (AB1), PME 2(1)), (AA (1281), PMI 3(1))
	EQUIVALENCE (AA(1601), V _X(1)), (AA(2001), VELY(1))
	EQUITALENCE (AA (2.01), W. Z(1)), (AA (2881), CP(1))
	REAL LSHAFT, LSHANK
	And the second s
	NREAD=5

	NMRITE=6
	NXMAX=6
	NYMAX=6
	NXMAXP=NXMAX+1
	NYMA Y D = NYMAYA 4
	NXYM P=NXMA XP=NYMAX P
	NSTAGEO
	NVORT=0
	MSPIRAL=8 NMAKBL=0
	NWARDL-U
	READ (NREAD, 2) NG ASE
	MRITE (NMRITE, 2) MCASE
	2 FORMAT(1015)
	3 FORMAT/1968-31
	4 FORHAT (2A4, 215)
•	DO 999 ICASE=1,NCASE
C	
	CALL DATA (NEL EN)
C	
	CALL DEEFRO (NHOGE, NYVHE, NOFCT, NELEN, NTHAKE)
C	
	CALL COOORT (NELEN, NXYMR NOFCT, YK, NNODE)
C	
3	CALL CHECK (NELEM, HXMAX, HYMAX, HTMAX)
•	CALL GEOMET (NELEM, NYYMB, NOFCT, NODE, YK, MODE, KHAKE, KROTOR)
	WRITE (6,60)
	AR FORMAT (181 MATH FR) H GEOMAT
3	
	IF(KPRINT(1).EQ.1)
	1 CALL FRINTA(MELEH, NXYMP, XK, NNODE, PC, NOFCT, NODE, 1)
	IF (KPRINT(2).EQ.1)
C	1CALL PRINTA (NELEM. NXYMP. XX. NNORE, PC., NO. FCT., NORE, 2)
•	CALL VECLESINELEM, MODE, 2C, R1, R2, P3, XK, MODE)
C	
	TECHBOTHTCES - FO-4)
	1CALL PRINTA MELEN, NXYMP, KK, NNODE, PC, NO FCT, NODE, 3)
	IF (KPRINT(4).EQ.1)
	- 1CALL PRINTA (NELEM, MXYMP, XX, MNODE, PC, NOFCT, NODE, A)
C	NECO-NEL PHENO
C	ME SO MELEM 992
	00.6 NM=1.MF30
	AA (NM) = 0 . 0
	S CONTINUE
C	
	DO O INS, MELEN
	NNN=I+(I-1)*NELEN
	SQUECE(T) = 0.0 AA (NNN) = 1.0

, 9	CONTINUE
	CALL COEFF (NELEM, PC, NNO) 5, XK, NOBE, KMAKE, NESQ, AA, SOURCE, BC, KROTOR, 1)
C	TE/METAG. NE. 01
	CALL COEFF(NELEM, PC, NNODE, XK, NODE, KWAKE, NESO, AA, SOURCE, BC,
C	TE(MV ORT, NE, 0)
	CALL COEFF(NELEM, PC, NN)DE, XK, NDDE, KWAKE, NESQ, AA, SOURCE, 8C,
C	IF (NRLADE FO. 1 .AND NWA (RLAME R)
	CALL COEFF(NELEM,PG, NN.) DE, XK, NODE, KWAKE, NESQ, AA, SOURCE, BC,
С	TECHPRENTIES, FO. 1) CALL STATECHEL FM. NESO, AA. SOURCE, 1)
C	TECKPRINT(6) -E0-1) CALL -> THTRONE EN MESO -AA SOURCE -2)
C	
C	CALL SOLUTNINELEM, MESO, 18, SOURCE)
C	TECKPAINT(7) EQ. 1) CALL : ZINTRINE EN , MESQ, AA, SOURCE, 3)
C	CALL AVERAGISOURCE, SOR. 2 C. NELEH. MODE, MOFCT, MYYMP, MYDDE, AVG)
C	CALL PHI (SOR, NNODE, NODE, 2HIC, PHIL, PHIZ, PHIZ, NELEN)
C	CALL MELYMPINELY, MELY, MELONES, PHES, PHES, PC, PL, PP, PS, MELEN
	CALL CPLINGICE, WELY, WELY, WELZ, PHTS, NELEN, PC, KROTORI
С	IF (KPRINTIB) . EQ. 1) CALL > RINTB (NELEM, NESQ, AA, CP, A)
C	CALL FORCE (MMODE XX MELTA MODE CO)
C 999	CONTINUE
	STOP

C	
3	SUBPOUTINE DATA (NELEM)
C	DATE GREATED # MARCH 31, 1975
19171-9	COMMON/ZZZ1/4x(3a), NY(3a), NXY(3a), KSYHMY, KSYMMZ, NSYMMY, NSYMMZ COMMON/ZZZ2/NSEX, NSBOOK, NS, NT(3a), TSEACE(3a), KNORML(3a), KMAKES(3a)
	COMMON/ZZZZJMPYLON,NBOO'1,NBOOY2,NBOOY3,NYTAIL,NSHAFT,NHUB,NSHANK,
	COMMON/ZZZ4/UMACH, OMEGA ALFA, ABETA
	COMMON/ZZZ6/4NOSE, X801,4302,XTAIL COMMON/ZZZZYNOSE, Y801,Y302,YTAIL
	COMMON/ZZZ9/RY801, Z801, Z302, ZTAIL COMMON/ZZZ9/RY801, Z2801, ZY802, ZZ302
	COMMON/ZZZIB/RSHAFT, LSHAFT, RSHANK, LSHANK COMMON/ZZZIS/XHUBCA, YHURIR, ZHUBCA, RYHUB, RYHUB, RZHUB
	COMMON/ZZZ12/RROTOR, BCH. RU, TAUBL, ALFA3 COMMON/ZZZ13/THETZS, THETLC, THE TLS, CONTING, AZZMUTH
	COMMON/ZZZ14/KBLADE, TAN. EB, TANTEB, XBLE, X9TE, KROTDRS (34)
	COMMON/ZZZ16/NMAKPY, NMAK18,NMAKSK,NMAK8L
Marana Majara	COMMON/ZZZ18/MANGPY, MAN, HB, MANGSK, MANGBL COMMON/ZZZ19/KPRIMI(18), MREAD, MMRITE, KREAD
	COMMON/ZZZZZYPI COMMON/ZZZZZYKRYE KRYZ
	COMMON/ZZZZZ/KNSELE, KNSS 1P, KNSTYP COMMON/ZZZZZ/KBDELE, KADS 1P, KBDTYP
	COMMON/ZZZZWKTNELE, KTNS 1P, KTNTYP COMMON/ZZZZWKDYELE, KDYS 1P, KDY TYP
	COMMON/ZZZZE/KYTELE, KYTS 1P, KYTTY3
	COMMON/ZZZZS/KHBELE, KHBSHP, KHBTYP
	COMMON/ZZZZZO/KBLELE, KBL3+P, KBLTYP COMMON/77731/NSTAG-NYORT-NSPIRAL-SPIRAL
	COMMON/22232/CSTAG,CVORF
	COMMON/ZZZSS/UHAKE
	COMMON/ZZZS1/MSPAN, XLEZ:, XTEZN, TANLEH, TANTEH, TAUH, ZP COMMON/ZZZSS/ITMIST, RPITCH, TMIST
	DIMENSION ACTORD(20), HN72(2), HNP1(2), HNPP(2), HNMP(2) DIMENSION GG(20),KSFACE(28)
	DIMENSION TCHORD(10), TAKIS(10), VCHORD(10), VAXIS(10)
С	MSFY= A
	DO 19 I=1,3 PEAR(NREAD_18) GG
19	MRITE(NMRITE, 20)GG ABAD(MAEAD, 18) GG(1), GG(2), KREAD
10	WRITE (NMRITE, 28) GG (1), GG (2), KR EAD FORMAT (28AA)
20	FORMAT(1x, 28A4)

C	
C	USE KZANNA=U
C	USE KSYMMZ=0
	READ(NREAD.18) GG(1),GG(2),NS,KSYHHY,KSYHHZ
	MRITE (MMRITE, 24) GG (1), G: (2), MS, KSYMMY, KSYMMY
	READ(NREAD,15) GG(1),GG(2),NPYLON,NBODY1,NBODY2,NBODY3,NYTAIL,
	MRITE (NMRITE, 28) GG(1), GG(2), NPYLON, NBJDY1, NBODY2, NBDDY3, NVTAIL,
	READ(NREAD,18) GG(1),GG(2),KPYL1,KPYL2
	MRITE (MMRTTE, 28) GE (1), G2 (2), KRYLL, KRYL2
18	FORMAT (2A4, 10 I 5)
	FORMAT (1X, 2AL, 1015)
	READ(NREAD, 12) GG(1), GG(2), UMACH, OMEGA, AREA
	MRITE (NMRITE, 22) GG(1), G (2), UMACH, OMEGA, AREA
	READ(NREAD, 12) GG(1), GG(2), ALFA, ABETA
12	FORMAT (2A4.7F8.3)
22	FORMAT(1X-244.7F10.8)
	IF(NPYLON.EQ.1)
	TREAD (HREAD, 12) GG(1), G-(2), XRYCTR, YRYCTR, ZRYCTR, RXPYL, RYPYL, RYPYL
	IF(NPYLON.EQ.1)
	INDITE (NIGITE 22) CC (1) CC (2) YOUCTA, YOUCTA, TOYCTA, AYOU , BYONL , BYONL
	IF(NVTAIL.EQ.1)
	1 PEAN (MEEAN 12) GG(1) GG(2) VSPAN X EZV, XTEZV, TAN EV, TANTEV, TAUV
	2 . ZPV
	TECHNYTATL EG. 11
	INRITE (NNRITE, 22) GG(1), GG(2), VSPAN, XLEZV, XTEZV, TANLEV, TANTEV, TAUV
	2 , ZPY
C	
	MIBO=NBOOY1+NBOOY2+NBOOY3
	NROTOR=NSHAFT+NHUB+NSHA-K+NBLADE
	IF (NTBO.NE.O)
	1 PEAD (NOFAD, 12) GE (1), GE (2), YNOSE, Y3D1, Y 9D2, YTAIL
	IF(NTBD.NE.D)
	INRITE (NHRITE, 22) GG (1), GG (2), XNOSE, XBO1, X9D2, XTAIL
	IF (NT9D.NE.O)
	18FAD (NRFAD . 12) GG (1) - GG (2) - YN CSE, Y 801 - Y 802, Y TAIL
	IF (NTBD-NE.0)
	1MRITE (MMRITE, 22) GG (1), G. (2), YMOSE, Y 801, Y802, YTAIL
	IF(NT8D.NE.0)
	1READ (NEEAD . 12) GG(1), GG(2), ZNOSE, ZRD1, ZRD2, ZTAIL
	IF(NTBO.NE.0)
	1MRITE(NMRITE, 22) GG (1), G. (2), ZHOSE, ZHO1, ZHO2, ZTAIL
	IF(NTOU.NE.O)
	1 PEAD (NEFAD, 12) CE (1), CE (2), RYBB1, R7RD1, RYBD2, R7RD2
	IF (NTBD.NE.O)
C	1MRITE (NMRITE, 22) 66(1),6:(2),8Y801,87801,8Y802,87802
C	TE (MSHAFT, FO. 1) READ (MREAD, 12) SG(1), GG(2), RSHAFT, LSHAFT
	IF (NSHAFT.EQ.1) MRITE (NIRITE, 22) GG (1), GG(2), RSHAFT, LSHAFT
	15 (MMIIQ. 50.4)
	1 READ (NREAD,12) GG (1) .GG. 2) . XHUBCR, YHUSCR, ZHUBCR, RXHUB, RYHUB, RZHUB
	IF (NHIIR-FD-1)
	INRITE (NHRITE, 22) GG (1) . GG (2) , XHUBCR, YHUBCR, ZHUBCR, RXHUB, RYHUB, RZHUB
	INRITE (NMRITE, ZZ) GG (1), G5 (Z), XHUBCK, THUBCK, ZHUBCK, RXHUB, RYHUB, RZHU

27.76	IF (NSHANK.EQ. 1) READ(NEED, 12) 66(1), 66(2), RSHANK, LSHANK TF (NSHANK.EQ. 1) HRITE (NHEITE, 22) 65(1), 66(2), RSHANK, LSMANK
	IF (NBLADE. EQ. 1) READ (NREAD, 12) GG(1), GG(2), RROTOR, YOUT, XBLE, XBTE
	1 TANBLE, TANBTE, TAUBL IF (NBLADE. EQ. 1) MRITE (NMRITE, 22) GG(1), GG(2), RROTOR, YOUT, XBLE, XBTE
	TANLE, TANGLE, TAUGL
	TANTERSTANSTE
	IF (NOLADE.EQ.1) READ(NEAD,12) 66(1), 66(2), THET75, THET16, THET15,
	IF (NBL ADE. EQ. 1) MRITE (NWRITE, 22) GG(1), GG(2), THET75, THE T1C, THET1S, L. CONLING, AZIMUTH
	IF(NBLADE.EQ. 1) READ(NEAD, 12)GG(1), GG(2), RPITCH, THIST
	IF (NBLADE.EQ. 1) WRITE (MWRITE, 22)65(1), GG(2), RPITCH, THIST IF (NBLADE, EQ. 1) READ (NFEAD, 16) 66(1), GG(2), KBLADE, IT WIST
	IF(NOLADE.EQ. 1) READ(NFIAD, 16) 65(1), 56(2), KOLADE, ITMIST IF(NOLADE.EQ. 1) MRITE(NM. ITE, 28) 65(1), 56(2), KOLADE, ITMIST
	READ(NREAD, 13) GG(1), G; (2), NWAKPY, NWAKAR, NWAKSK, NWAKBL
	MATTE (MHRITE, 38) CC(1), CC(3), MMAKOY, MMAKON, MMAKEN, MMAKEN, MMAKEN,
	IF ((NHAKHB+NHAKSK+NHAKB_) . NE. 0) 1 READ (MREAD-15) GG(1),GG(2),MSPIRAL,SPIRAL,UMAKE
	IF ((NWAKHB+NWAK SK+NWAKBL) . NE. 0)
	. WATTE (NURTE, 36)GG(1), CG(2), MSPIRAL, SPIRAL, UNAKE
	TE (NMAKPY.EQ. 1) READ (NEAD.18) GG (1), GG(2), NSTAG, NVORT
	TE (MMAKRY EQ. 1) MRITE (MM LTE, 2816G(1), GG(2), METAG, MVDET
	IF(NWAKPY.EQ.1) READ(NEEAD,12) GG(1), GG(2), GSTAG, GVORT IF(NWAKPY.EQ.1) WRITE(NW.LTE,22) GG(1), GG(2), GSTAG, GVORT
	FORMAT(2M,15,2F8.3)
	E FORMAT(1X, 2AL, 15, 2F8. 3) READ(NREAD, 19) GG(1), G; (2), (KPRINT(K), K=1, 10)
	MRITE (NUMETE, 28) CC (1), C: (2), (KARENT (K), K-1,18)
C	
	IF (UNACH.GE. 1.8) CALL SERUG(188)
	HULTY=1
	TE (KSAHHA 'EU' U) MIT 1A=3
	MULT=1 IF(KSYNNZ.EQ. 8) MULT=2
	MS=0
	TE (MT BD NE . D MSENS + (NBO) Y 1 + NBOOY 2 + NBO OY 3) PMUL TYMUL TY
	IF (NPYLON.NE.O.OR.NYTAINE.O) HS=HS+(NPYLON+HYTAIL) + MULTY
	IF (HMUS. NE. 0) MS-MS-MSW STOMUL TYANHUG PMIL TOMULTY
	IF (NROTOR-NE-0) MS=MS+K3LADE*(NSHANK+NBLADE*HULT)
Č	TECHS-HE-HSI CHEC-DEADOLE-SO.
Ğ	
	REFLEN=1.
	BETA-SORT (ABS (UNACHES2-1-))
	KS=0
	NS8TOT=0
C	
C	
	TECHBOOK1.50.01CO TO 199
	KS=KS+1 MSBORYaNSBORYa1

	MRITE (NMRITE, 28) GG (1), GG (2), NX (KS), NY (KS), KNSELE, KNSSHF, KNSTYP NXY (KS)=NX (KS)=NY (KS)
	ISFAGE(KS)=1 KNORHL(KS)=1
	KWAKES(KS)=0 KROTORS(KS)=0
3	EZDIOZNIKNIZE
•	TE (KSYMMY NE. 8) GO. TO 170
	NSBODY=NSBODY+1
	TATAN FILE LANGUAS FILE (2 AC CHUCAS PAUDEN ALAUNG NA WALLE
	MX (JS) =MX (KS)
	MA (12) THA (K2)
	(2X) YXH=(2L) YXH
	ISFACE (JR) = 9
	KWAKES (JS) =0
	KNORML (JS) x-1'
	KROTORS(JS)=8
170	CONTINUE
	IF(KSYMMZ.NE.0)60 TO 199
	NSBODY=NSBODY+1
	KSL=KS+NBODY1+NBODY2+NBODY3+NPYLON
	WX (KST) = NX (KS)
	NY (KSL) =NY (KS)
	MAAINGI) = MAAING)
	ISFACE (KSL)=5
	KWAKES (KSL) = f
	KNORML (KSL) =-1
	KROTORS (KSL) 20
C	
	IF (KZYMMY-NE-0) 60 TO 193
	NSB0DY=NSB00Y+1
	JELEKSL+(NOON) TATUM (EVOOEV+SYOCEN+ LYOORN) + 123 = 12L
	NX (JSL) =NX (KS)
	NA (12F)=NA (KZ)
	NXY(JSL)=NXY(KS)
	T SEACE (JSL) = 1/3
	KWAKES (JSL) =0
	KNORMI (LISL) = 1
	KROTORS(JSL)=0
199	CONTINUE
C	
	MARGE AND
C	
	IF (MBODY2-EQ. 0) 60 TO 292
	KS=KS+1
	LA YOURZNEY TOOR 2M
	READ (NREAD, 18) GG (1), GG (2), NX (KS), NY (KS), KBDELE, KBD SHP, KBDTYP
	MOTTE (MMRTTE, 24) GG (1) . G. (2) . MY (KS) . MY (KS) . KROELE . KROENE . KROTYO
	HXY(KS)=NX(KS)+NY(KS)
	ISFACE (KS) =2
	KNORHL (KS) =1
	KPOTORS (KS) an
	KNAKES (KS) =8
C	
	IF (RSYPHY NE D)60 TO 2/1
	IF(KSYMMY.NE. 8)GO TO 277

	N X (JS) = NX (KS)
	HXY(JS)=HXY(KS)
	ISFACE(JS)=10
	KHAKES (JS) = 0
	KNORNL (JS) ==1
278	KROTORS(JS)=8 CONTYNIE
778	
	IF(KSYMMZ.ME.0)60 TO 299
	KSL=KS+NBODYL+NBODYZ+NBODYZ+NPYLON
	MA (KG1)=MA (KG)
	NY(KSL)=NY(KS)
	NXA (K 2F) *MXA (K 2)
	ISFACE (KSL)=6
	KHAKES (KSL) = 8
	KNORHL (KSL) =- 1
	K807085(K51)=8
C	
	IF (KSYMMY-NE-8) 50. TO 293
	NSB0DY=NSB0DY+1
	JSL=KSL+(NB00Y1+NB00Y2+130BY3) FMULT+NPYLOM+NVTAIL
	NX(JSL)=NX(KS)
	HY (JSL)=NY (KS)
	HXY(JSL)=HXY(KS)
	ISEAGE (JSL)=0
	KNOOM (ISI) a 1
	KROTORS (JSL)=0
299	CONTINUE
299 C	CONTINUE
C	AFT-30DY
C	and the contract of the contra
C -	
C -	######################################
C -	### AFT-30DY
C -	LF(NBODY3.EQ. 0) GO TO 393 KS=KS+1 MSBODY=MSBODY+1 READ(NREAD,19) GG(1),GG(2),NX(KS),NY(KS),KTNELE,KTNSHP,KTNTYP
C -	EKMBODY3.EQ. 8) GO TO 393 KS=KS+1 MSBODY=MSBODY & 1 REAN(NREAD, 19) GG(1), GG(2), NX(KS), NY(KS), KTNELE, KTN SHP, KTN TYP HRITE(MMBITE, 28) GG(1), GG(2), NX(KS), NY(KS), KTNELE, KTN SHP, KTN TYP
C -	######################################
C -	######################################
C -	LE(MBODY3.EQ, 0) GO TO 393 KS=KS+1 MSBODY=MSBODW 1 READ(MREAD, 19) GG(1), GG(2), NX(KS), NY(KS), KTNELE, KTNSHP, KTNTYP MRITE(MMRITE, 20) GG(1), GG(2), NX(KS), NY(KS), KTNELE, KTNSHP, KTNTYP NXY(KS)=NX(KS)*NY(KS) KNORML(KS)=1
C -	IE(MBODY3.EQ. 8) GO TO 393 KS=KS+1 MSBODY3.EQ. 8) GO TO 393 KS=KS+1 MSBODY3.ESOOW &: READ(NESAD, 19) GG(1), GG(2), NX(KS), NY(KS), KTNELE, KTNSHP, KTNTYP MRITE(MWBITE, 28) GG(1), GG(2), NX(KS), NY(KS), KTNELE, KTNSHP, KTNTYP NXY(KS)=NX(KS)*NY(KS) ISEAGE(KS).E3 KNORML(KS)=1 KMAKES(KS).E0
C -	LE(MBODY3.EQ, 0) GO TO 393 KS=KS+1 MSBODY=MSBODW 1 READ(MREAD, 19) GG(1), GG(2), NX(KS), NY(KS), KTNELE, KTNSHP, KTNTYP MRITE(MMRITE, 20) GG(1), GG(2), NX(KS), NY(KS), KTNELE, KTNSHP, KTNTYP NXY(KS)=NX(KS)*NY(KS) KNORML(KS)=1
C -	LE(MBODY3.EQ. 0) GO TO 393 KS=KS+1 MSBODY=MSBODW+1 READ(MREAD,19) GG(1),GG(2),NX(KS),NY(KS),KTNELE,KTNSHP,KTNTYP MRITE(MMRITE,20)GG(1),GG(2),MX(KS),NY(KS),KTNELE,KTNSHP,KTNTYP NXY(KS)=NX(KS)*NY(KS) LSEAGE(MS)=3 KNORML(KS)=1 KMAKES(MS)=0 KROTORS(KS)=8
C -	E(MBODY3.EQ. 8)GO TO 393 KS=KS+1
C -	F(MBODY3.EQ. 8) GO TO 393 KS=KS+1
C -	IF (NBODYS, EQ. 0) GO TO 393 KS=KS+1 MSBODY=MSBODYA: READ(NREAD, 19) GG (1), GG (2), NX (KS), NY (KS), KTNELE, KTNSHP, KTNTYP MBITF (NWBITF, 2A) GG (1), GG (2), MX (KS), NY (KS), KTNELE, KTNSHP, KTNTYP NXY (KS)=NX (KS) = NY (KS) KNORHL (KS)=1 KMAKES (KS)=0 KROTORS (KS)=8 IF (KSYHMY.NE. 0) GO TO 370 MSBODY=MSBOOYA: JS=KS+(MBODY1+NBODY2+NBODY2+NBODY3) *MULT+NPYLON+NVTAIL
C -	IF (MBODY3.EQ. 0) GO TO 393 KS=KS+1 MSBODY=MSBODW 1 READ (MREAD, 19) GG (1), GG (2), NX (KS), NY (KS), KTNELE, KTNSHP, KTNTYP MRITE (MMRITE, 2A) GG (1), GG (2), MX (KS), NY (KS), KTNELE, KTNSHP, KTNTYP NXY (KS)=NX (KS)** NY (KS) KNORML (KS)=1 KMAKES (KS)=0 KROTORS (KS)=8 IF (KSYHMY.NE. 0) GO TO 370 MSBOOY=MSBOOY 4. JS=KS+(MBODY 2+NBODY 2+NBODY 3)**HULT+NPYLON+NVTAIL NX (JS)=NX (KS)
C -	E (MBODY3.EQ. 8) GO TO 393 KS=KS+1
C -	IF (NBODYS, EQ. 0) GO TO 393 KS=KS+1 MSADDY=MSBODYA+1 REAT(NREAD, 10) GG (1), GG (2), NX (KS), NY (KS), KTNELE, KTNSHP, KTNTYP MBITF (NWBITF, 2A) GG (1), GG (2), MX (KS), NY (KS), KTNELE, KTNSHP, KTNTYP NXY (KS)=NX (KS)=NY (KS) ISEAGE (KS)=3 KNORHL (KS)=1 KNORHL (KS)=6 KROTORS (KS)=8 IF (KSYHMY.NE.0) GO TO 370 MSOD DY=MSBOOYA+1 JS=KS+(NBODY1+NBODY2+NBODY3)*HULT+N PYL ON+NYTAIL NX (JS)=NY (KS) MX (JS)=NY (KS) MX (JS)=NY (KS)
C -	IF (MBODY3.EQ. 0) GO TO 393 KS=KS+1 MSODY=MSODY=1 FANGE (2), NX (KS), NY (KS), KTNELE, KTNSHP, KTNTYP MRITE (MWRITE, 2A) GG (1), GG (2), NX (KS), NY (KS), KTNELE, KTNSHP, KTNTYP NXY (KS)=NX (KS)*NY (KS) NX (KS), NY (KS), KTNELE, KTNSHP, KTNTYP KTNT
C -	E(MBODY3.EQ. 0)GO TO 393 KS=KS+1 MSBODY3MS8ODWA1 READ(NREAD,19) GG(1),GG(2),NX(KS),NY(KS),KTNELE,KTNSHP,KTNTYP MRITE (NMRITE,28)GG(1),GG(2),NX(KS),NY(KS),KTNELE,KTNSHP,KTNTYP NXY(KS)=NX(KS)*NY(KS) ISFACE(KS)=3 KNORML(KS)=1 KMAKES(KS)=0 KROTORS(KS)=0 IF(KSYHMY.NE.0)GO TO 370 MSBODY=MSBOOWA1 JS=KS+(NBOOY1+NBOOY2+NBODY3)*MULT+NPYLON+NVTAIL NX(JS)=NY(KS) NXY(JS)=NY(KS) MXY(JS)=NY(KS) MXY(JS)=NY(KS) ISFACE(JS)=11 KMAKES(JS)=11 KMAKES(JS)=11
C -	IF (MBODY3.EQ. 0) GO TO 393 KS=KS+1 MSODY=MSODY=1 FANGE (2), NX (KS), NY (KS), KTNELE, KTNSHP, KTNTYP MRITE (MWRITE, 2A) GG (1), GG (2), NX (KS), NY (KS), KTNELE, KTNSHP, KTNTYP NXY (KS)=NX (KS)*NY (KS) NX (KS), NY (KS), KTNELE, KTNSHP, KTNTYP KTNT
C -	E (MBODY3.EQ. 0) GO TO 393 KS=KS+1 MSBODY=MSBODY 1 FANC (NRCAD, 19) GG (1), GG (2), NX (KS), NY (KS), KTNELE, KTNSHP, KTNTYP MPITE (NWPITE, 2A) GG (1), GG (2), NX (KS), NY (KS), KTNELE, KTNSHP, KTNTYP NXY (KS) = NX (KS) = NY (KS) KTNELE, KTNSHP, KTNTYP KNORHL (KS) = 1 KMAKES(KS) = 0 KROTORS (KS) = 8 IF (KSYHMY.NE.0) GO TO 370 MSBODY=MSBOOY 1 NSBODY=MSBOOY 1 NBODY 1 NBODY 2 NBODY 3 *MULT+NPYLON+NVTAIL MX (JS) = MX (KS) MXY (JS) = MX (KS) MXY (JS) = MX (KS) MXY (JS) = MX (KS) KNORHL (JS) = -1 KNOTORS (JS) = 0 KROTORS (JS) = 0 K
G C	E (MBODY3.EQ. 8) GO TO 393 KS=KS+1

```
KSL=KS+NBOBY1+NBODY2+NBODY3+NPYLON
      MX (KZI ) = MX (KZ)
      NY (KSL)=NY (KS)
      ISFACE(KSL)=7
      KNORHL (KSL) =- 1
C
      TECKSYMMY NE DI GO TO 393
      NS 800Y=NS800Y+1
       TATEMANO IN SHALL THE LEAD OF THE TANGEN TANGEN TALE
      MX (72F) =MX (K2)
      HXY(JSL)=HXY(KS)
      KWAKES (JSL)=0
      KROTORS(JSL)=0
      CONTINUE
C
   3
      TE ( M BYL ON - EO. 81 CO TO 492
      KS=KS+1
MSBORY=NSBORF+1
      READ(NREAD, 18) GG(1), GG(2), NX(KS), NY(KS), KPYELE, KPY SHP, KPYTYP
MRITE(NMRITE, 2R)GG(1), GG(2), NX(KS), NY(KS), KRYELE, KPY SHP, KEYTYP
NXY(KS)=NX(KS)*NY(KS)
       ISEACE (KS) =
      KNORML (KS) =1
KNAKES (KS) =1
      KROTORS(KS)=0
      IF (KSYMMY.NE. 8)60 TO 499
      MSRORY - MSRORY 41
      JIATV M+M0 JY9 M+TJUM* (EYO C8M+SYO 08M+1YO 08M) XM=C (JX) XM
      ISFACE (JS) =12
      KNORML (JS) =-1
KROTORS (JS) =0
499
      CONTINUE
      EYCCBN+ SYCOBN+ 17008N=2 YCOBN
C ----- VERTICAL TILL -----
       NS80DY=NS80DF+1
      ISFACE (KS) =8
```

	KNORML (KS) =-1
	KWAKE S (KS) =1
•	KROTORS (KS) =0
	IF (KSYMMY.NE. 0)60 TO 599
	-NS8007=NS800741-
	JS=KS+(NBODY1+NBODY2+NB)DY3)
	NY (JS) =NY (KS)
	HXY(JS)-HXY(KS)
	ISFACE(JS)=16 KHAYES/JSL=1
Many Company	KHORML (JS) =+1
	KROTORS (JS) =0
C	
599	CONTINUE
C	90703 64465
C	POTOS SHAFT
•	TE (NSHAFT, FD. R) GO TO 694
	NS80DY=NS80DY+1
	KZ=(MBODY1-NBODY2-MBODY3) -MULT-MULTY-(MYLON-NYTAIL) -MULTY
	KS=KS+1
	PEAD (NEEAD . 13) GG (1) . GT (2) . NY (NE) . NY (NE) . KENELE . KENEND . KENTYD
	HRITE (NWRITE, 20) GG (1), GG (2), NX (KS), NY (KS), KSHELE, KSHSHP, KSHTYP
	ISFACE(KS) = 17
	KNOBNI (KZ) = 1
	KHAKES (KS) =0
	KROTORS (KS)-1
C	
	IF (KSYMM-NE-8) GO TO - 693
	NSB007=NSB0DY+1
	NX(JS)=NX(KS)
	MA (16) = MA (KG)
	NXY(JS)=NXY(KS)
	ISFACE (JS) ×18
	KWAKES(JS)=0
	KROTORS (JS) =1
-	
699	CONTINUE
C -	ROTOR HUB
	IF(NHU8.EQ. 8) 60 TO 799
	KS-MBODY SPHIL TYACKE FLOMANYTATLANSMET SHILL TY
	KS=KS+1 MSB0DY=MSB0DY+1
	READ (MREAD, 15) 'GG(1), GG(2), HX(KS), HY(KS), KHBELE, KHBSHP, KHBTYP
	MRITE (MARITE, 24) GG(1), GG(2), MX (KS), MY (KS), KMBELE, KHB SHP, KMBTY
	HXY (KS) =HX (KS) PHY (KS)
	I SEACE (KS) +13
	KNORHL (KS) =1
	KANKES (KS) # 1
	KROTORS (KS)=1

C	
	IF (KSYMMY NE. 8) 60 TO 770
	NS 80 DY = NS 80 DY + 1
	JSEKS+NHUB-RUL T
	NX(JS)=NX(KS)
	NA (142) = MA (K42)
	NXY (JS) =XXY (KS)
	ISFACE (JS) = 21
	KNAKES (JS) =1
	YNORML (JS) a=1
	KROTORS (JS) =1
7	79 CONTINUE
	IF(KSYMMZ.NE. 0)GO TO 799
	NSBODY ANSBODY A1
	KSL=KS+1
	MA (KET) = MA (KE)
	HY(KSL)=NY(KS)
	MAA(REL)-MAA(RE)
	ISFACE(KSL)=20
	KNAKES (KSL) =1
	KNORML (KSL) == 1
	KROTORS(KSL)+1
3	
	TE (KSYMMY, NE. 8) 60 TO 793
	NSB0 DY=NSB0DY+1
	JSI #JS+NHILR+MIN T
	JSL=KSL+NHUB• HULT
	MX (121) =MX (KZ)
	NY (JSL) =NY (KS)
	NAA(181)=NAA(K2)
	ISFACE (JSL)=22
	KANKES (TIST) = 1
	KNORML (JSL)=1
	KROTORS (JSL) = 1
	799 CONTINUE
Č C	ROTOR SLADE SHANK
	IF (NSHANK.EQ. 8)60 TO 899
	NET THE CATE HAND OF THE TANK TANK TANK THE TANK THOU THE TANK THE TANK
	1NSHAFT MULTY+NHUB HULT44JLTY+1
	DE VOLHERO TO TO TO TO THE TANGENT OF THE TANGENT O
	WRITE (NWRITE, 20) GG (1), GG (2), NX (KS), NY (KS), KSKELE, KSK SHP, KSKTYP
	MKTIE (MMKTIE) SOLGO (1) , 60 (S) , MK (K3) , MI (K3) , KONEEE , KON 3HE , KON 11
	00 818 K=1,K8LADE
	NSBOOY-NSBOOY-1
	KSS=KS+(K-1) = (NSHANK+NB. 4 DE = MULT)
	NX (KS2) =HX (KS)
	NY (KSS) =NY (KS)
	NXA(KZZ)=NX(KZ) ±NA(KZ)
	ISFAGE (KSS) = 23+(K-1) *3
	KNOBM (KZZ) 41,
	KWAKES (KSS) =1
	KROTORS (KSS) . 1
The latest the second second second	
81	
81	6 CONTINUE
81 C 89	

3	POSSESSE POTOR BLAST ASSESSESSES
C	
	IF (NBLADE. EQ. 8) 60 TO 99.
	KS= (NBODY1+NBODY2+NBOJY3)*NULT*MULTY+ (NPYLON+NYTAIL)*NULTY+
	READ(NREAD, 18) GG(1), G(2), NX(KS), NY(KS), KBLELE, K3LSHP, KBLTYP
	METTE (MMOTTE, 24) GG (1), GG (2), MX (KS), MY (KS), KOLELE, KOL SHP, KOLTYP
3	
	DO 918 K=1,KBLADE
	KCC=KC+(K-1)=(MCMANK+M& ADE=MILT)
	NX (K22) =NX (K2)
	MA(K22) #MA(K2)
	NXY (KSS)=NX(KS) PNY (KS)
	ISFACE (KSS)=SAA(K-1) #3
	KNORML (KSS) =1
	NAMES (MSS) = 1.
	KROTORS (KSS)=1
	IF (KSYNNZ.NE. 0) GO TO 919
	NS800Y=NS800YA1
	KSSL=KSS+1
	HA (KEST) =HA (KES)
	MY(KSSL)=MY(KSS)
	MXA(K22F)=MXA(K22)
	ISFAGE (KSSL)=25+(K-1)+3
	KNORML (KSSL)=-1
	LE (1824) SPOTORY
910	CONTINUE
999	CONTINUE
C	
·	MEI EM R
	HRITE (6, 6082)
	DO 1000 TS-1, NS
1000	NELEH=NELEH+NXY (IS)
	HRITE (6, 4891) MELEN
8001	FORMAT (//5X,*NELEH = *,15/)
3002	FORMAT (/18X, SHOATA)
	MSBTOT=0
	00 1100 TS=1, HS
	NT(IS)=NS8TOT
	HERTOT-NERTOTANK (22) WHATOTERN-TOTERN
	HRITE (6,0003) IS, NX (IS), NY (IS), NXY (IS), ISFACE(IS), NT (IS), MNORML (IS), MIAKES (IS)
8003	FORMAT (5X,*IS= *,I5,2%,*NX=*,I5,2X,*NY=*,I5,
	2 * KNORML=*, IS, * KM (ES=*, IS)
	CONTINUE
C	
c	RETURN

C	SUBROUTINE COORT (NELEM. NXYMP, NOECT, XX, NMORE)
C	SHOWING THE COUNTRY CHEEFER WATERS WITH CLOSE SHOULDED
•	COMMON/2771/NX(36) NY(36) NXY(36) KSYMMY KSYMMZ NSYMMY NSYMMZ
	COMMON/2222/NSFX, NSBODY, NS, NT (34) , I SFACE (34) , KNORML (34) , KNAKES (34)
	COMMON/7773/48YLON, MBOOK : , NBOOMS, MBOOK T, MYTATL, MSHAFT, NHUB, MSHANK
	1 NOLADE
	GOMMON/7776/UMACM.OMEGA. ALEA.ABETA
	COMMON/ZZZS/XPYCTR, YPYCTR, ZPYCTR, RXPYL, RYPYL, RZPYL
	COMMON/7776/4NOSE, XBOL, X3D2, XTAIL
	COMMON/ZZZY/YNOSE,YBO1,/302,YTATL
	COMMON/2778/7NOSE, 7RO1, 7302, 7TAIL
	COMMON/ZZZ9/RY 9D1, RZ8D1, RY8D2, RZ8D2
-	COMMON/77710/ PSHAFT, I SHAFT, SHANK, I SHANK
	COMMON/ZZZ11/XHUBCR, YHU3CR, ZHUBCR, RXHUB, RYHUB, RZHU3
	COMMON/27712/RROTOR, BCID RD, TAUBL, AL FAR
	COMMON/ZZZI3/THETTS, THETIC, THETIS, CONING, AZZMUTH
-	COMMON/ZZZ15/VSPAN, XLEZY, XTEZY, TANLEY, TANTEY, TAUV.ZYTAIL
	COMMON/27716/NMAKPY, NMAC 48, MMAKSK, N MAKR
	COMMON/ZZZ17/WAKLPY, WAK. 18, WAKLSK, WAKL BL
	COMMON ZZZZ SYMANGPY, MANG 4R, MANGSY, MANG SY
	COMMON/ZZZ19 KPRINT(10), NREAD, NWRITE, KREAD
	COMNON/77720/PT
	COMMON/ZZZZ1/KPY1.KPYZ
	COMMON/77722/KNSELF.KNSS-P.KNSTYP
	COMMON/ZZZZ3/KBDELE, KBOS 1P, KBOTY
	COMMON/22226/KIMELE, KIN; HP, KIMIYP
	COMMON/ZZZZS/KPYELE, KPYSHP, KPYTYP
	COMMON/2226/KYTELE, KYT: 49, KYTTY2
	COMMON/ZZZZ7/KSHELE, KSH5 HP, KSHTYP
	COMMON/7772A/KHBELE, KHBSHP, KHB TY2
	COMMON/ZZZ29/KSKELE, KSK5+P, KSKTYP
	COMMON/77730/KRLELE, KRLS4P, KRLTY7
	COMMON/ZZZ31/NSTAG, NVORT, NSPIRAL, SPIRAL
	COMMON/77733/IIWAKF
	COMMON/ZZZSWYCUT
	COMMON/ZZZSO/XCT2,YCT2,ZCT2,ZCT2,RX,RY,RZ
	COMMON/22251/HSPAN,XLE21,XTEZH,TANLEH,TANTEH,TAUH,ZP
-	DIMENSION ACTORD(20), HNPP(2), HNPH(2), HNMP(2), HNMH(2)
	DIMENSION ARCH MNOUL MUSELINAAN TY CELSON KEEVELLY
	DIMENSION OFPP(2).OFPH(2).OFMP(2).OFHM(2)
	OTHENSION HCHORD(11) HAYTS(11) WCHORD(11) VAYTS(11)
	DIMENSION HCSI(11), HETA(11)
	PEAL I SHAFT I SHANK
C	
	MSE V= 3A
	KREAD=0
C	
	IF (KREAD.EQ.0)GO TO 9
	READ (NREAD, 15) ((XK (K, : NODE), K=1, 3), I NODE=1, NNODE)
	write (nwrite, 25) ((xk (k, 1 400E), k=1, 3), INDDE=1, NNODE)
-	FORMAT (TEL2.A)
	GO TO 900
-	CONTINUE

	REFLEN=1. BETA=SORT(ABS(UMACH##2=1.))
	HULT=1
	EF (KSYMMZ-EQ. 8) MULT-3
	HULTY=1
	FORMAT (10F6.3)
	FORMAT (1x, 10F8-3)
	PI=3.14159265
288	FORMAT (2X, AIS=4, IS, 2X, AI +=4, IS, 2X, AIY=4, IS, 2X, AIXY=4, IS,
	1 *NOFCT=*, 15)
c	
·	KFACE=NBODYLANBODYZANBODYZANRYLON
C	
-	PYLON COCCO
C	
	IF (NPYLON, EQ. 8) GO TO 19.
	KS=KFAGE
	DYY=1./NY(KS)
	HXP=HX(KS) 41
	HYP=NY (KS)+1
	THEFE-KHARFE
	IF (LPYELE.NE. 8) GO TO 122 IF (LPYELE.NE. 8) GO TO 102
	LPYELE-1
	READ(MREAD, 18) (MCSI(IX), IX=1, MXP)
	MRITE (NMRITE, 25) (HCSI(IX), IX=1, NXP)
	READ (HREAD, 15) (HETA (LY) , LY=1, HYP)
	WRITE (NWRITE, 25) (HETA([Y), IY=1, NYP)
	CONTINUE
	00 118 IX=1,4XP
	XX=(IX-1)+0X(
	44-(14-1) s044
	IF (KPYELE. EQ. 0) XX=HCSI (I ()
	IF (KRYELE-EQ. 8) YY=HETA(LY)
	GO TO(131,132,133), LPYELE
131	CSI=XX
	ETANY
	60 TO 113
1.32	CONTINUE
	CSI=XX*XX
133	CONTINUE
133	CSTel.e(Lexx) ##2
	ETASYY
113	CONTINUE
	THETA=PI*ETA
	3 X = CG 1 + DX DYL
	RY=CSI TRYPYL
-	YS=RY=COS(THETA) YS=RY=SIN(THETA)
	78-878YL

	I NODE=NOFCT([XY,KS) XK(1.INODE)=X8+XPYCTR
	XK(2, INODE) =Y 0+YPYCTR
	XX(3, TNODE) =7 0+7PYCTP
	WRITE (6, 140) IX, IY, IXY, GSI, ETA, INDDE
	MRITE (6, 142) x 0, 70, Z0
	WRITE (6.143) (YK (L. INODE) . L. 1.3)
	FORMAT(18X,*IX=*,I5,2X,*IY=*,I5,2X,*IXY=*,I5,2X,*GSI=*,E12.6,2X, !PETA=+,F12.6,2X,*IMODE=+,IS)
	FORMAT(18X, "THETA=", £12.5, 2X, "RX=", £12.6, 2X, "RY=", £12.6)
143	FORMAT(18X, 9X8=9, E12-6,2X, 9Y8=9, E12-6, 2X, 978=9, E12-6) FORMAT(18X, 9XK=9, 3(E12-5, 2X))
115	CONTINUE
199	CONTINUE
	K6-8
C	194 No. 1
Ġ	
	IF (NBODY1-FO-8)60 TO 593
	KS=KS+1
	DO SOA TRODYES MILT
	IF(IBOCY1.EQ.1)SIGNZ=+1.
	NXP=NX (KS) +1
	HYPANY(KS) 41
	DXX=1./NX(KS)
	IINCR=8.59DI/NY (KS)
	DO 550 IX=1,NXP
	IF (KNSELE.EQ.1) CSI=XX
	IE (KNSEL E. EO. 2) CST-XX+XX
	X=XNOSE+(XBDL'-XNOSE) CST
	IF (KNSSHR. EQ. 1) PRY=RYBOL+SQRT (CSL)
	IF (KNSSHP.EQ.1) RRZ=RZBDL+SQRT (CSI)
	IF (KMSSHP. FQ. 2) PRY=RYRM = (CSI) == .3333333
	IF (KNSSHP.EQ. 2) RRZ=R Z301 + (CSI) ++.3333333 ZE (KNSSHB.EQ. 3) RRY=R Y301 + (CSI) ++.25
	IF (KNSSHP.EQ. 3)RRZ=RZBD1+(CSI)++.25
	00 554 77-1,479
	THET= (IY-1) TINCR
	THETAR (AR. SPRI-THET)
	ETA=COS (THETA)
	ZZ=SIGNZ*RRZ*SIN(THETA)
	DEL 7= (7804-740SE)
	DOWNZ=0ELZ-0ELZ=CSI 77=77-00M2
	22=22+2801
•	TYVETY 4/TY att SNYO
	IF (IBODY1, EQ. 1) IS=KS
	IF (IRONYL-FO-2) ISEKS+KF) CF
	WRITE (6, 140) IX, IY, IXY, GST, ETA, NOFCT (IXY, IS)

	WRITE(6,142)X,YY,ZZ	
	XK(1,NOFCT(IXY,IS))=X	
	XK(2, NOFCT(IXY, IS)) = YY 	
558	CONTINUE	
594	CONTINUE	
599	CONTINUE	
	CONTROE	
C		
	IF (NBODY2.EQ. 8)60 TO 69	
	XS2XSA1	
	00 698 IBODY2=1,MULT	
	IFIIRONY2-FQ-1) SIGN7=+1-	
	IF (IBODY2.EQ. 8)\$I64Z=-1.	
	HXPRHX (KS) 41	
	NYP=NY(KS)+1	
	TINCR-0.54AI/HY (KS)	
	OXX=1./NX(KS)	
	00 631 TX-1,4XP	
	XXX=(IX-1)=DXX	
	IF (KODELE-EO-1) CSI=XXX	
	IF (KBDELE.EQ. 2) CSI=XXX T (X	
	R1=RYBD1+(RYBD2-RYBD1) CET	
	R2=RZBN1+(RZ9D2+RZ9D1) = SI	
	DEL 7= 7802+7801	
	ZZZ=DELZ=CSI	
	XX=X8.01 \ (X805 = X801) = CS.E	
	00 631 IY=1,NYP	
	THETA-(4.690) -(24-() STINCA)	
	YY=R1 COS (THETA)	
	77*SIGAZORZOSTN/THETA)	
	ZZ=ZZ+ZZZ+Z801	
	IF(IB 00Y2.EQ. 1) IS=KS	
	TE (1800A5 'EU' 5) 42*K2*K2" .E	
		-
	XK(1, NOFCT (IXY, IS)) = XX XK(2, NOFCT (IXY, IS)) = YY	
	XK(3, NOFCT(IXY, IS))=ZZ	
471	CONTINUE	
698	CONTINUE	
699	CONTINUE	
C		
C	TATL NOSE	
	IF (N8 0073.EQ. 8) GO TO 899	
	K Cake At	
	DO 898 IBODY3=1, MULT	
	TE CTRONYS. FO. 1 ISTENZ=+1.	
	IF(IBODY3.EQ. 2) SIGNZ =-1.	
	NXB#NX(KG)+1	
	NYP=NY (KS) +1	
	DXX=1- (MX (XS)	
	TINCR=0.5*PI/NY(KS)	
	DO ASE TYELNYP	
	XX=(IX-1)+0XX	

	XX=1XX
	TECHTNELE, FO. 1) CST = XX
	IF(KTHELE.EQ.2)CSI=XX+XX
	IF(KINSHP.EQ.1)RRY=RY802=SQRT(CSI) IF(KINSHP.EQ.1)RRZ=RZ802=SQRT(CSI)
	TECKLINGING EO SI BOA-BABOA-CAL
-	IF (KTNSHP. EQ. 2) RRZ=RZ80(*CSI
	CST=1CST
	X=XBD2+(XTAIL-XBD2)*CS1
	DO ASA TYALAYP
	THET=(IY-1)*TINGR
	THETARIAN, SPRI-THET
	ETA=COS (THETA)
	YYERRYOFTA
	ZZ=SIGNZ+RRZ+SIN (THE TA)
Ċ	
•	051 7=77ATI =7902
	DOWNZ = CEL Z + CS I
	77=77+DOMM Z+7AD2
C	
c	
	IXY=IX+(IY-1) *NXP
	TELTRONYS. FO. 1) TS-KS
	IF (IBODY3.EQ. 2) IS=KS+KFACE
	XX(1, NOFCT (TXY, TS)) xX
	XK(2, NOFCT(IXY, IS))=YY
	XK(3, NOFCT (T(Y, TS)) = ZZ
850	CONTINUE
101	CONTINUE
899	CONTINUE
C	VERTICAL TAI
č	VERTICAL TAL.
	IF (NYTAIL. EQ. 0) GO TO 39
	KSE (NAODYLANGOVENBODYE) PHILL TANDYL ON & 1
	00 398 IVTL=1,1
<u>c</u>	
	IF (KYTTYP.EQ. 1) GO TO 3178
	SEAD (MEEAD, 15) GG(1), GG(2), HMPP, HMPH, HMMP, MMMM
	MRITE (NMRITE, 25) GG (1), GG (2), HNPP, HNPM, HNMP, HNMM
3170	
	SIGNZ=+1.
	TATLL NEWSPAN-2. PR
	TAILWD=TAILLH/2.
	PLEAS.
	RIEst.
	RIES. RTES.
	RLERS. RTESS. RTYSS./NY/NY. DYYSS./NY/NY.
	NXP=NX (KS)
	RTE=0. OYX=1 - /NY (KS) MYD=NY (KS) +1 NYP=NY (KS) +1
	VIEL 6=KVIEL 6
	RLERS. RTERS. RYPAL JAY (KS). NYPAMX (KS). NYPAMX (KS).41 LYTELERWISLE IF (LYTELERS.8) GO TO 3138
	RIERS. RTESS. RTESS. RYPENY(KS) 41 RYPENY(KS) 41 LYTELERKYTELE LYTULERKYTELE LYTULERKYTELE LYTULERKYTELE LYTULERKYTELE
	RLERS. RTERS. RYPAL JAY (KS). NYPAMX (KS). NYPAMX (KS).41 LYTELERWISLE IF (LYTELERS.8) GO TO 3138

3100	WRITE (NWRITE, 25) GG(1), GG(2), (HETA(IY), IY=1, NYP)
	DO 316 IX=1,NXP
	00 314 TY=1.4YP
	XX=(IX-1)+0XX
	AA=(IA=()=DAA
	IF (KYTELE.EQ. 0) XX=HCSI(LX)
	IFINITELE.EQ. 0) YY-HETA(IY)
3131	60 TO (3131, 3132, 3133, 3134), LYTELE
->->->	CSI=XX
7	ETA-YY
-	60 TO 313
31.32	CONTINUE
	CSI=XX*XX
	ETAx1.a(1.a/Y) 9.02
	GO TO 313
3133	CONTINUE
	C2I=XX
	ETA=1.=(1.=YY)**2
1134	GO TO 313
3834	CZI=XX+XX
	FIANY
313	CONTINUE
<u>c</u>	TECKNITYE NE 1) GO TO 3132
	Y=TAILWOPETA
	XLE-XLEZY-TA-LEVP(Y-QLO
	XTE=XTEZV+TANTEV+(Y-RTE)
	VCHORD (IV) - YTE-YLE
	VAXIS (IY) = XLE + VCHORO (IY) • 0.5
C	TATELY TO THE TA
11.79	CONTINUE
	IF (KYTTYP.NE. 2)GO TO 31 3
	X1=(MMED(1)-4MMP(1)) PCSTAMMP(1)
	Y1=(WNFP(2)-WNMP(2))*CS.+WNMP(2)
	X2=(MMEH(1)-4NHH(1))=CST+MNHH(1)
	Y = (W H F M (2) - W H M (2)) * C ST + W H M (2)
	X3=(MMER(1)=MMRM(1)) PETA-MMRM(1)
	Y3=(WNFP(2)-WNPM(2)) PET1 + WNPM(2)
	AP=(RMMb(5)=4 MM(5)) aE10+ MMM(5)
	UEL= (X1-X5) & (X3-AP) & (X3-(P) & (A1-X5)
	IF(DET.EQ. 0.) 60 TO 3147
	X8(1X1-X2) P(XAPYX-XXPYA) - (XX-XALP(X2PX1-X1PX2))/JET
	Y=((Y1-Y2) *(X4*Y3-X3*Y4) - (Y3-Y4) *(X2*Y1-X1*Y2))/DET
	GO TO 3149
3147	CONTINUE
	YAYA
	7=74
3149	CONTINUE
C	60 TO (3181, 7152, 3163), (475MB
3151	CONTINUE
<u>c</u>	
C	FOR CIRCULAR BICONVEX

C	XC=6.5*(XLFAXTF)
	PL=0.5+(XTE-XLE)
	ATAU 2.4H
	ETACRAL ATAU/VERAN
	XXC=X-XC
	7:0.
	IF(M.EQ0OR.IY.EQ.MYP.JR.IX.EQ.1.OR.IX.EQ.MXP)SO TO 315
	30 TO 315
3152	CONTINUE
	TAURAR TAUVE 75 SOOT (T.) F (XTETV-XLETV)
	Z=SIG NZ* TAUBAR*SQRT(CSD *(1CSI)*SQRT(1ETA**2)
3153	CONTINUE
	Z-CIGHZSA STAUNSENTEZN-CEZNI SCCI SEL -CCI) SCORTEL -FTABB2)
315	CONTINUE.
<u> </u>	IXY=IX+(IY-1) *NXP
	XK(1.NOFCT(IXY,KS))=X
	XK(2,NOFCT(IXY,KS))=Z
	YK(3, NOFCT (IYY, KS))=YAZVIAIL
318	CONTINUE
398 399	CONTINUE
233	CONTINUE
C	SHAFT
<u> </u>	
	IF(NSHAFT.EQ.0)60 TO 299 KS=(NBODY1+NBODY2+NBODY3+HULT+HULTY+(NPYLON+HYTAIL)+HULTY
	KS=KS+1
	DXX=1~(NX (KZ)
	0YY=1./NY (KS)
	MALMA (KZ) *1
	NYP=NY (KS)+1
	I SHELE = KSHELE GO TO 2:1
	TEU SHELE NE BIGO TO 281
	LSHELE=1
	READ(NGEAD, 15) (MCST(TX), TX=1, NYR)
	WRITE (NWRITE, 25) (HCSI(IX), IX=1, NXP)
	PEAD (HREAD, 15) (HETA(TY) -TY=1, HYP)
204	WRITE (NWRITE, 25) (HETA(I/), IY=1,NYP)
	00 218 IX-1,NXP
	DO 214 IVELAND
	XX=(IX-1)*0XX
	YY=(TY=1)=OYY
	IF(KSM LE.EQ. 0) XX=HCSI([X]
	IF (KEMELE.ED. 8) YYMHETAY (Y) GO TO (231,232,233), LSHELE
231	CONTINUE
	CSI•XX
	FIANT
	60 TO 213

CONTINUE
ETA-YY
<u>50 70 213</u>
CONTINUE
CS341-0(1-0XI)483
ETA=YY CONTINUE
THETA=PI*ETA
DERMART
X8=R*COS(THETA)
VA-DECTH (TUETA)
ZO=CSI=LSHAFT
TYYATYA (TY-1) PHYD
I NODE = NOFCT (IXY, KS)
YK(1. THODE) =KSAYRYCTR
XK(2, INODE)=Y0+YPYCTR
YKIE THOOK - PRYCTAL SHAFF - ZOARZRYL
WRITE (6,61)KS, IX, IY, IXY, INODE
HRITE (6,62) X8, Y8, 78
WRITE (6,63) (XK(L, INODE), .=1,3)
FORMAT (10Y, SKS=0, IE, D (+8, IE, B [Y=8, IE, B [XY=8, IE,
1 * INODE=*,15)
FORMAT(LEX, #18=4,612.6, # 18=4,512.6, # 28=4,512.6)
FORMAT(10X,* XK= *,3(E12.6,2X))
CONTINUE
IF(NHU8.EQ.8) 60 TO 499
KE-INBOOTIANOOTZAHOOTZI PHULTPHULTYA (NRYLONANITATL) PHULTYA
1 NSHAFTOHULTY
DO 498 INULT=1, MULT
IF(IMULT.EQ.1) SIGNZ= 1
IFITHULT-EQ.21 STGHZ==1.
DYX=1./NX(KS)
DYY=1./NY(KS)
HXRahx (KS) A1
NYP=NY (KS) +1
LHOSE S-KHOSES
IF (LHBELE.NE. 8) GO TO 400
IF (LHBELE.NE. 8) GQ TO 488 LHBELE.1
LMBSLE=KMBSLE IF(LMBSLE.NE.B)GO TO 400 LMBSLE=1 READ(NREAD,15) (MCSI(DX),IX=1,NXP)
LMSSLS=KMSSLS IF (LMSSLS=NE.0)GO TO 400 LMSSLS=1 READ (NREAD, 15) (MCSI(IX), IX=1, NXP) MRITE(MURITE, 25) (MCSI(IX), IX=1, NXP)
LMBELE-NE-0) GO TO 400 LMBELE-NE-0) GO TO 400 LMBELE-1 READ (NREAD, 15) (HCSI(IX), IX=1, NXP) MRITE (NURITE, 25) (HCSI(IX), IX=1, NXP) READ (NREAD, 15) (HETA(IY); IY=1, NYP)
LMBELE-NESE IF (LMBELE.NES 0) GQ TO 400 LMBELE.1 READ (NREAD, 15) (MCSI(DX), IX=1, NXP) MRITE (NMRITE, 25) (MCSI(DX), IX=1, NXP) READ (NREAD, 15) (META(IX), IX=1, NXP) MRITE (NMRITE, 25) (META(IX), IX=1, NXP)
LMSELE=KMSEE IF (LMSELE=NE.8) GO TO 400 LMSELE=1 READ (NREAD,15) (MCSI(DX),IX=1,NXP) MRITE (NWRITE, 25) (MCSI(DX),IX=1,NXP) READ (NREAD,15) (MCTA(IX),IX=1,NXP) MRITE (NWRITE, 26) (MCTA(IX),IX=1,NXP) CONTINUE
LMSCLE=KMSCLE IF (LMSCLE=NE.0)GO TO 400 LMSCLE=1 READ (NREAD,15) (HCSI(IX),IX=1,NXP) MRITE (NHRITE, 25) (HCSI(IX),IX=1,NXP) READ (NREAD,15) (HCTA(IY);IY=1,NYP) MRITE (NHRITE, 25) (HCTA(IY);IY=1,NYP) MRITE (NHRITE, 25) (HCTA(IY);IY=2,NYP) CONTINUE DO 418 IX=1,4XP
LMSCLE-MAGLE IF (LMSCLE.NE.0) GO TO 400 LMSCLEAT READ (NEAD, 15) (MCSI(IX), IX=1, NXP) MRITE (MURITE, 25) (MCSI(IX), IX=1, NXP) READ (NREAD, 15) (META(IY); IY=1, NYP) MRITE (NURITE, 26) (META(IX), IX=2, NYP) CONTINUE DO 410 IY=1, NYP
LMSSLE=KMSSLE IF (LMSSLE=1 READ (NREAD, 15) (MCSI(IX), IX=1, NXP) MRITE (MNRITE, 25) (MCSI(IX), IX=1, NXP) READ (NREAD, 15) (META(IX), IY=1, NXP) MRITE (MNRITE, 25) (MCTA(IX), IY=1, NYP) MRITE (MNRITE, 25) (MCTA(IX), IX=2, NXP) CONTINUE DO \$18 IX=1, NXP DO \$10 IX=1, NXP XX=(IX=1) NXYP
LMSELE-MASLE IF (LMSELE-ME.0) GO TO 400 LMSELE-1 READ (MREAD, 15) (MCSI(IX), IX=1, MXP) MRITE (MMRIYE, 25) (MCSI(IX), IX=1, MXP) READ (MREAD, 15) (META(IY); IY=1, MXP) MRITE (MMRITE, 25) (META(IY); IY=1, MYP) MRITE (MMRITE, 25) (META(IY); IX=1, MYP) CONTINUE DO 410 IX=1, MXP DO 410 IX=1, MXP XMA(IX=1) DOXX VY=(IY-1) *DYY
LMSCLE=KMSCLE IF (LMSCLE=NE.0) GO TO 400 LMSCLE=1 READ (NREAD, 15) (HCSI(IX), IX=1, NXP) MRITE (NHRITE, 25) (MCST(IX), IX=1, NXP) READ (NREAD, 15) (HETA(IY); IY=1, NYP) MRITE (NHRITE, 25) (META(IX), IX=1, NYP) CONTINUE DO 418 IY=1, NYP YX=(IX=1) TOXY YY=(IY-1) TOYY IF (KMSCLE_EO, 0) YX=MCSI(IX)
LMSELE-MASLE IF (LMSELE-ME.0) GO TO 400 LMSELE-1 READ (MREAD, 15) (MCSI(IX), IX=1, MXP) MRITE (MMRIYE, 25) (MCSI(IX), IX=1, MXP) READ (MREAD, 15) (META(IY); IY=1, MXP) MRITE (MMRITE, 25) (META(IY); IY=1, MYP) MRITE (MMRITE, 25) (META(IY); IX=1, MYP) CONTINUE DO 410 IX=1, MXP DO 410 IX=1, MXP XMA(IX=1) DOXX VY=(IY-1) *DYY

	CSI=XX
	FTASYY
439	CONTINUE
	CSI=XX*XX
	ETA=YY
	60 TO 413
77.4	CONTINUE
	CSI=1(1XX)**2
413	CONTINUE
413	THETARDIPETA
	RX=CSI PRXHUB
	RY=CS TERYHUR
	XE=RX *COS(THETA)
	YOZRY STRITHETAL
	Z0=SIGNZ*RZHJ8*SQRT(1 X0/RXPYL)**2-(Y0/RYPYL)**2)
	IS=KS+(IMULT-1)
	INCOE = NOFCT(IXY-IS)
	XK(1, INODE) =X 0+XHUBCR
	XX (Z. TNOOE) #Y 8+YHURCA
	XK(3, INODE)=Z8+ZHU9CR
	MRITE (6,61) IS, TY, TY, TYY, [MODE
	WRITE (6,62) X3, Y0, Z0
444	CONTINUE
418	CONTINUE
199	CONTINUE
<u> </u>	
900	CONTINUE
C	
	NSS=(NBODY1ANBODY2ANBODY3) FMULTANBYLON
	1 +NVTAIL
	224,1=23 010 00
	JS=IS+HSS
	HXP=HX(IS)+1 HYP=HY(IS)+1
	00 918 IX=1.HXP
	00 910 IY=1,NYP
	TAA-TAV(TA-1) SHAB
	XK(1, NOFCT(IXY, JS))=XK(1, NOFCT(IXY, IS))
	XK(2, NOFCT([XY, JS)) = -XK(2, NOFCT([XY, [S))
	xk(3, NOFCT(IXY, JS))=xk(3, NOFCT(IXY, IS))
	MRITE(6,54)IXY,IS 4 FORMAT(18X,*IXY=*,I5,2%,*IS=*,I5)
210	CONTENUE
C	TE(MSHAET, EQ. 8) GO TO GL1
C	
	IS-MSS-MULTY+1
С	IS-NSS-MULTY+1 JS-IS-1
С	IS=NSS*MULTY+1 JS=ISA1 MXP=NX(IS)+1
С	IS=NSS*MULTY+1 _IS=ISA+ MXP=NX(IS)+1 MXP=MX(IS)A+
С	IS=NSS*MULTY+1 JS=ISA1 MXP=NX(IS)+1

	WRITE (6,54) IXY, IS **K(1,MOECT(IXY, IS) >= XK, 1,MOECT(IXY, IS))
	XK(2, NOFCT(IXY, JS)) =-XK(2, NOFCT(IXY, IS))
	YKIZ-MOFCT (IXY- JE)) . XKIZ-MOFCT (IXY-IS))
912	CONTINUE
	CONTENUE
C	
	TE (NHUB. EQ. 6) GO TO 913
	IS1=NSS=NULTY+NSHAFT+HULTY+1
	00 914 IS=IS1,IS2
	ISATSAMIN TY
	NX P=NX (IS) +1
	HYERNY (IS) AS
	DO 915 IX=1,NXP
	00.915 IY=1,HYP
	IXY=IX+(IY-1) *NXP
	XK(1, NOFCT(IXY, JS)) = XK(1, NOFCT(IXY, IS))
	XK(S, NOFCT (IXY, JS)) = AR(1) NOFCT (IXY, TS))
	XK(3, NOFCT(IXY, JS)) = XK(3, NOFCT(IXY, IS))
	CONTENUE
	CONTINUE
	CONTINUE
C	
C	
č	SACRESCO BLADE SHANK ASSESSED
C	
	IF (NSMANK-EQ-8) 60 TO 793
	KS=(NBODY1+NBODY2+NBODY3) *NULT*HULTY+(NPYLON+NYTAIL) *NULTY
	NHUR THILT THILTY-NSHAFTTHUL TY-1
•	00 798 IB=1,KBLADE
	IF (IB.EQ.1)SIGNY=1.
	IF (IB - 60, 2) SI GW1
C	
	DXX=E-/MX(KS)
	DYY=1./NY (KS)
	MAGNA (KZ) vī
	NYP=NY (KS) +1
	IF (LSKELE.NE. 0) GD TO 707
	I SIFL Fat
	READ(NREAD,15) (HCSI(IX);IX=1,NXP)
	MRITE (MMRITE, 26) (MCSI(I/), TX=1, MYP)
	REAB(HREAD, 15) (HETA(IY), IY=1, HYP)
	MATTE (MATTE, 25) (METALTY) , IV-1, NYP)
700	CONTINUE
	00 718 IV=1.NYP
	XXXITX-11-FRX
	YY=(IY-1)*0YY
	TRINENELE ED BY YVANCET TY
	IF (KSKELE.EQ. 0) YY=HETA(IX)
731	CSI=XX

	GO TO 713
732	CONTINUE
	CSTate(1.eW) PPZ
	ETA=YY
	60.70.713
733	CONTINUE
	CSTRYXOYY
	ETA=TY
713	CONTINUE
	THETA=2. PITETA
	YARMORR
	X0=R*COS (THETA)
	ZORRESTNICTUETA)
	Y 0=CSI*LSHANK
-	IXY=IX+(IY-1) *NXP
	TERESOLIE (MELADERNIE TANGHAME)
	INODE=NOFCT (IXY.IS)
	XX(1. INQUE) =CHUBCR+X8
	XK(2, INODE) =SIGNY (YHUBCR+RYHUB+LSHANK-YD)
	YKIS INODEL -ZHUBCRAZE
	WRITE (6,61) IS, IX, IY, IXV. [NODE
	HRITE (4,42) X8, X8, Z0
	WRITE (6,63) (XK(L,INODE), .=1,3)
718	CONTINUE
798	CONTINUE
799	CONTENUE
C	
C	
č	
C	ROTOR BLADE
<u></u>	
	IF(NOLADE.EQ. 0) GO TO 1039
	THE LITTINGUATEN CALIFORNIA TO AND LESSON SENDEN SAUDEN TANDERS TO AND THE SAUDEN SAUD
	1 +NSHAFT-HULTY +NHUB HULT "HULTY +NSHANK
	BO 1998 TRE1, KRI ADE
	KS=KKS+1+(IB-1) *(HBLADE* 4ULT+HSHANK)
	DO 1897 INULTAL, MULT WRITE (6,55) IB, I HULT, IXY, IS, X,Y,Z
-	MKT 16 (9)331 19 1 10 C 1 3 TV 1 7 3 5 V 1 1 5
	SIGNY=1.
	IFIINULT-F" ANSTENZAL.
•	IF (IMULT-EQ.2) SIGNZ = -1.
	GRR#1./HK(KS)
	DYY=1 (NY (NY)
	NXP=NX (KS) +1
	NYPENY (KS) 61
	LOLELE=KOLELE
	TELLALELE NELD GO TO 1988
	LBLELE*1
	DEAR (MEEAR . 15) (MCCT (TY) . TYA1 . MY2)
	WRITE (NWRITE, 25) (HCSI(I(), IX=1, HXP)
_	

1000	CONTINUE DO 1818 TYPE NYP
	DO 1018 IY=1, NYP
	XX=(IX=1)=0XX
	YY=(IY-1)*0YY
	TECHNOLOGICAL AND
	IF (KBL ELE. EQ. 0) YY=HETA(IY) GO TO (1031,1932,1033,13A) LBLELE
1031	
	ETA=YY
	60 70 1013
1032	CONTINUE
	ETA=1(1YY)**2
1033	
	CSIONX
	ETA=1(1YY) **2
1934	CONTINUE
	CSTAXXAXX
	ETA=YY
	CONTINUE
	SCHORD-XSTE-XSLE
	XTEZ=XBTE
	TANGLESTANIES
	TANGTE=TANTEB
	SPAN-3.4990TOR
	Y= (RROTOR-YCJT) =ETA+YCUT XLE#XLEZ+TANGLE = Y-Y-YCUT
	XTE=XTEZ+TANBTE+(Y-YCUT)
	FCHORD-XTE-XLE
	X=XLE+FCHOR (PCSI
C	
•	GO TO (1051-1052-1053)-(31 SHP
1051	CONTINUE
	FOR CIRCULAR SICONVEX
	FOR CIRCULAR SICUNDEN
	XC=0.5*(XLE+XTE)
	PLAG-ST (YTE-YLE)
	TAUSL = . 050
	H=TAUPPL
	ATAIls 9. Su
	ETAGR=1ATAJ/SPAN
	Zal.
	IFIN-EQ-0OR-IV-EQ-NYP DR-IX-EQ-1-OR-IX-EQ-NYP)GO TO 11E
	Z=SIGHZ (SQRT (((PLPL+# 1)/(2. PH)) PPZ-XXCPPZ)-(PLPPL-HPH)/(2. PH))
•	GO TO 115
1052	
	TAUBAR=TAU-,75 -SQRT (3.) - (XTEZ-XLEZ)

	Z=SIGNZ*TAUBAR*SQRT(CSI)*(1CSI)*SQRT(1ETA**2)
1053	CONTINUE
	Z=SIGNZPA.PTAUF(XTEZ=XLIZ) PCSI+(1.=CSI)+SQRT(1.=ETA++2)
115	CONTINUE
	IXY=IX+(IY-1) *NXP
	ISAKS
	IF (IHULT.EQ.2) IS=KS+1
	IN COE - NOFCT (IXY, IS)
	XK(1, INODE)=X
	XKIS- INODE LAF STEMY
	XK(3, INODE)=Z+ZHUBCR
	AZIM=AZIMUTHPPI/188.
	60 TO (381.382) TIMIST
C	They require the same of the s
381	CONTINUE
	PITCHR=APITCH*PI/180.
	PITCHT & CAPITCH+THIST) PR/188.
	X1=YCUT
	Y2=RROTOR
	XX=XK(1,INODE)
	YY=XK(2, INODE)
	ZZ=XK(3,INODE) C1=(YY-X2)/(X1-X2)
	C2=(YY-X1)/(X2-X1)
	DYXX2-X1
	PITCH=C1*PITCHR+G2*PITCHT
	60 70 303
302	CONTINUE
	PITCHR*RPITCH*PI/188.
	PITTS=(THETTS+THET1C*COS (AZIM)+THET1S*SIN(AZIM))*PI/180.
	X1=YCUT X2=,75*RROTOR
	XX=XK(1.TNODE)
	YY=XK(2,INODE)
	77aXK (3.TNOOF)
	C1=(YY-X2)/(X1-X2)
	C2=(YY-X1) / (X2-X1)
	0x=x2-x1
	PITCH CLIPPITCH PACSED 1775
383	CONTINUE
	DE THIST
<u> </u>	COSPIT=COS (PITCH)
	CINDITACIN (PITCH)
3	
	XK1=XK(1,TNODE)
	XK3=XK(3, INODE)
	XK(1, INODE) = XK19COSPIT (K39SINDIT
	XK(3, INODE) =- XK1 - SINPIT+ XK3 - COSPIT
C COM	ING ANGLE
c	
	CONE = COMING PI/180.

	END - CENTRAL ACTION OF THE PROPERTY OF THE
C	OFFICE A
	FORMAT(18X, Page END OF COODET
<u> </u>	WRITE (6.60)
1099	CONTINUE
1098	CONTENUE
1097	CONTINUE
	CONTINUE
	1 *XYZ=*.3(E12.6.2X))
	MRITE(6,55) IB, IMULT, IXT, IS, X, Y, Z FORMAT(18X, PIB=P, IS, 2X, PIMULT=P, IS, 2X, PIXY=P, IS, 2X, PIS=P, IS, 2X
<u> </u>	UATTE / & EEL TO THE T TWO TO V V T
	XK(2, INODE) = XK1 PSIN (ANG R) +XK2 PCOS (ANG R)
	XK(1.TNODE)= XK19COS (AMGS) -XK29SIN(ANGR)
C	
	XK2=XK (2-TNODE)
-	XK1=XK(1,INO)E)
	ANGR=ANGT(IB-1)
	ANGEZ - PIZKRLANE
C	
	XK(3-INODE)= XKTESINHSAX(SECOCHS
	XK(1, INODE)=XK1+COSHZ-XC2+SINHZ
	XKS=XK(2.TNO0E)
•	XK1=XK(1,INO)E)
•	SINHZ=SIN(HZIM)
	COSHZ-COS(HZIM)
	HZIM= (AZIMUTH-90.) *PI/190.
<u> </u>	
C AZI	WITH
	XK(3, INODE) = XK2*SING+XK3*GOSC
	XKIS-INODE) = XKS#COSC+XKS#SINC
	XK3=XK(3, INODE)
	XX2=XX(2,IN00E)
0	 A CHARLE AND COMPLETE TO COMPLY THE RESIDENCE OF THE PROPERTY OF
	SINCESIN CONFI

SUBROUTIME CHECK ONFLEM, XMAX, MYMAX, MEMAX) COMMON/ZZZI/YX(3), NY(3), NXY(3), KSYMY, KSYMNZ, NSYMMY, NSYMMZ COMMON/ZZZZXSXX, MSRODY, MS, MT.ISA), ISFACE ISAJ, KMORM, I TAJ, KM KES(34) COMMON/ZZZS/NPYLON, N8ODY1, N8ODY2, N8ODY3, NYTAIL, NSMAFT, NHUB, NSMANK, MBLAGE COMMON/ZZZ4/UMACH, OMEGA, ALFA, ABETA COMMON/ZZZ4/UMACH, OMEGA, ALFA, ABETA COMMON/ZZZ5/XPYCIR, YPYCI2, ZFYCIR, RXEYL, 2 YPYL, RZPYL COMMON/ZZZ5/XNOSE, X8D1, (3D2, XTAIL COMMON/ZZZ7ZY/MOSE, X8D1, 23D2, YTAIL COMMON/ZZZ7ZY/NOSE, Z8D1, 23D2, YTAIL
COMMON/ZZZZ/MSE X, MSBODY, MS, MT (3A) - I SFACE (3A), KMÔRM (3A) - KM KES (3A) COMMON/ZZZJ/MPYLOM, NBODY L, NBODYZ, NBODY J, NYTAIL, NSMAFT, NHUB, NSMANK, MBLADE COMMON/ZZZ4/UMACH, OMEGA-ALFA, ABETA COMMON/ZZZ4/UMACH, OMEGA-ALFA, ABETA COMMON/ZZZ4/YMACH, YBOTZ-ZFYCTP, RKEYL, ZYPYL, RZPYL COMMON/ZZZ5/XNOSE, XBOT, < 3DZ, XTAIL COMMON/ZZZ7/YMASE, YBOT, Y3DZ, YTAIL
COMMON/ZZZ3/NPYLÖN,NBODY1,ÑBODY2,ÑBODY3,NYTAÏL,ÑSHAFT,ÑHUB,NSHANK, MBLADE COMMON/ZZZ4/UMACH,OMEGA-ALFA,ABETA COMMON/ZZZ5/XPYCTR,YPYCTZ,ZFYCTR,RXFYL,RYPYL,RZPYL COMMON/ZZZ6/XNOSE,XBO1,43D2,XTAÏL COMMON/ZZZ7/YNOSE,YBD1,Y3D2,YTAÏL
COMMON/ZZZ4/UMACH, OMEGA ALFA, ABETA COMMON/ZZZ4/XPYCZZ, YPYCZZ, ZEYCZZ, RXEYL, ZYPYL, RZPYL COMMON/ZZZG/XNOSE, X801,<302, XTAIL COMMOM/ZZZZ/YMOSE, Y801, Y302, YTAIL
COMMON/ZZZ4/UMACH, OMEGA ALFA, ABETA COMMON/ZZZ4/XPYCIZ, YPYCIZ, ZEYCIZ, RXEYL, 2YPYL, RZPYL COMMON/ZZZ6/XNOSE, X801,<302, XTAIL COMMOM/ZZZ7/YMOSE, Y802, Y302, YTAIL
COMMON/7775/XPYCTR, YPYCT2, 75YCTR, RX5YL, 2YPYL, R7PYL COMMON/7776/XNOSE, X801, 4302, XTAIL COMMOM/7777/YMOSE, Y801, 4302, YTAIL
COMMON/7776/XNOSE, X8D1, < 3D2, XTAIL COMMOM/7777/YNOSE, Y8D1, Y3D2, YTAIL
COMMON/7777/YNOSE, YADL, Y3D2, YTATL

A ALLIANA TOTAL THE TENT OF TAR TOTAL TOTAL
COMMON/7779/PYR01.27801.27802.87302
COMMON/ZZZ18/RSMAFT, LSM FT, RSMANC, LSMANK
COMMON/27711/XHUSCR, YHUS TR. ZHUBCZ, R XHUB, RYHUB, RZHUB
COMMON/ZZZ12/RROTOR. BCH. 3D. TAUBL. AL FA3
COMMON / 7774 3/ THE TZE - THET LC - THE TS S-CONT NG - AZ THUTH
COMMON/ZZZ14/KBLADE, TANL : 8, TANTES, X BLE , X 3TE, KROTORS (34)
COMMON 27715/ MSBAN VI ETV. YTE TW. TANLEW TANTEN TAN TYTATI
COMMON/ZZZ16/NWAKPY, NWAK 18.NWAKSK, NWAKAL
COMMON/77717/WARLBY WAR 48 WARLSY WARLS
COMMON/ZZZ16/WANGPY, WANS 18, WANGSK, WANG BL
COMMON / 77719/ KPOINT (18) . NREAD MARITE . KREAD
COHHON/ZZZZ0/PI
COMMON/77724/KDV4 KDV2
COMMON/ZZZZZ/KNSELE. KNST4P. KNSTYP
COMMON/7.27.23/KBDEL F. KBDS 12. KBDTYP
COMMON/ZZZ24/KTNELE. KTNS 4P. KTNTYP
COMMON / 77725/ KDYFL F. KDYS 1D. KDYTYD
COMMON/ZZZZ6/KYTELE, KYTS-IP, KYTTY>
COMMON/777 27/YSHELF YSHS 48 YSHTYS
COMMON/ZZZ28/KHBELE, KHBS 1P, KHBTY?
COMMON/77729/KSKFLF, KSKS 1P, KSKTY9
COMMON/ZZZ30/KBLELE, KBLS 1P, KBLTYP
COMMON/77731/NSTAG. NVORT. NSPIRAL SPIRAL
REAL LSHAFT LSHANK
(2.5 Colina (12.5 linux)
00 100 IS=1.NS
TE (MY (TS) GT. MYMAY) CAL DEBUG (300)
IF (NY (IS) .GT. NY MAX) GAL DEBUG (388)
CONTINUE
IF (NELEM.GT. NTHAX) CALL DEBUG (500)
MATTER CO.
FORMAT (10X END OF CHECK ")
PETIEN.
ENO

C	SUBROUTINE PREPRO (NHODE, NXTHP, NOFCT, NELEM, NTHAKE)
C	
	THIS SUBROUTINE FUNCTIONED AS A PRE-PROCESSER. ON RETURN.
C	THE CO-ORDINATES OF NOTES IN THE GLOBAL NUMBERING SYSTEM
	MILL OF RE-CONSTRUCTED TO CIVE CO-DROINATES IN THE LOCAL
C	NUMBERING SYSTEM FOR INDIVIDUAL SURFACES.
<u> </u>	
C	
	INTEGER PP,P4,HP,H4
	DIHENSION NOFCT(NXYMP, 3+)
	COMMON (2221/MX (34) , MX (34) , MXX (34) , X SY AMY , X SYMMZ , MSY MAY , MSY MAZ
	COMMON/ZZZZ/MSFX, NSBÓDY, MS, NT (34), I SFACE (34), KNORML (34), KMAKES (34) COMMON/ZZZZ/MBYLON, NBODYL, NBODYZ, NBODY 3, NBTATL, NSMAFT, NNUB, NSMANK,
	1 NBLADE
	COMMON/2274/UMACH, OMEGA, ALFA, ASETA
	COHHON/ZZZS/XPYCTR, YPYCTR, ZPYCTR, RX PYL, RYPYL, RZPYL
	COMMON 2776/YNOSE, Y801,/302, YTATI
	COMMON/ZZZ7/YNOSE, Y8D1, Y3D2, YTAIL COMMON/ZZZ8/ZNOSE, Z8D1, Z3D2, ZTAIL
	COMMON/ZZZ9/RYBD1, RZBD1, RYBD2, RZBD2
	COMMON/ZZZ18/RSHAFT, LSH. FT, RSHANK, LSHANK
	COMMON/ZZZ11/XHUBCR, YHUBCR, ZHUBCR, RXHUB, RYHUB, RZ4UB
	COMMON/22212/ RROTOR, BCH: 10, TAUBL, AL FAR
	COHMON/ZZZ13/THET75, THET1C, THET1S, CONING, AZIMUTH
	COMMON ZZZZIA KBLADE, TAM EB, TANTEB, XBLE, XBTE, KROTORS (34)
	COMMON/ZZZ15/VSPAN, XLEZV, XTEZV, TANLEV, TANTEV, TAU, ZVT AIL
	COMMON/22216/NHAKDY, NHAK 48, NHAKSK, NHAKSL
	COHMON/ZZZ17/WAKLPY, WAK 18, WAKLSK, WAKL BL
	COMMON/77718/MANGRY, MANGRE, MANGRE, MANGRE, MANGRE
	COMMON/ZZZ19/KPRINT(10). WREAD, NWRITE, KREAD
	COHMON/ZZZZ1/KPYL1,KPYL2
	COMMON/277222/KNSELE, KNST4P, KNSTYP
	COMMON/ZZZZ3/KBOELE, KBOS 4P, KBOTY>
	COMMON /77724/K THELE, KINS 48, KINTY2
	COMMON/ZZZ 25/KPYELE, KPYT 4P, KPYTYP
	COMMON/27726/KYTELE, KYT: 4P, KYTTYP
	COMMON/22227/KSHELE, KSH6 4P, KSH TYP
	COMMON/ZZZZZZKHBELE, KHBCHP, KHBTYP
	CONHON/ZZZ 29/KSKELE, KSK 1P, KSKTYP
	COMMON/22230/KBLELE,KBL:HB,KBLTYB
	COMMON/ZZZ31/NSTAG, NVORT, NSPIRAL, SPIRAL
C	00 26 Tel-MS
CZ4	WRITE (6,234) NX(I), NY(I), NT(I), KNORHL(I), ISFACE(I)
CC	
	MULT=1
	TE (MEYMAZ.E).G) MIN TAZ
	HULTY=1
	TE (KSYMMY-EQ-8) MIL TY=2
CC	
<u></u>	
CC	

CC	MODEXED
	NODEU=8
	IF (MTBOOV - FO. B) GO TO 13
	NODEX=1
	28 NODEX=NODEX+4X(I)
CC	
	TE(NTBORY.NE. 8)
cc	1NO DEU-NO DEU+NO DEX+ (NY (NT 80 DY)+1) - (NT 8 00 Y-1)+NY (NT 80 DY)
CC	NODEX=NUMBER OF NODES ALONG AIRCRAFT CENTERLINE
CC	
CC	NODEU=NUMBER OF NODES OF UPPER RHS FUSELAGE BODY
CC	
CC	
	IS=0
	NODE 02.0
_	NLAST=0
-	IF (NBODY1-EQ-0)60 TO 99
	ISTAL
	MXP=MX(IS)+1
	NYPANY(IS)+1
	00 88 IY=1,NYP
	00 80 IX=1;NXP IXY=IX+(IY-1)*NXP
_	
	IF(IX.EQ.1.AND.IY.GT.195) TO 85
85	CONTINUE
	INCOERHODES
	IF(IX.EQ.1)INODE=1
	NOFCT (IYY, IS) - INODE
80	CONTINUE
C	
_	-NLAST=NOOE0
	IF (NB 00Y2.EQ. 0) GO TO 193
	IS-IS-1
	NXP=NX(IS)+1
	00 188 IY=1,NYP
	00 180 IX-1,NXP
_	IXY=IX+(IY-1)+HXP
-	IF(IX.EQ.1)60 TO 195
	MODE RENODERAL
185	CONTINUE
	IF(IX.EQ.1) INQUE= (NX(1)+1)+(IY-1)*NX(1)
180	CONTINUE
199	
C	

	NLAST=NODEO
	IS*IS+1
	HXP=HX(IS) 41
	NYPENY (IS) +1
	00 288 IY=1,NYP
	DO 288 IX=1,4XP
C	IXA=IX+(IA-i) +HAB
•	IF(IX-EQ-1)60 TO 285
	IF(IX.EQ.NXP. AND.IY.GT.1) GO TO 295
	NOTE A = NOTE RAS
285	CONTINUE
	INCOERNODEO
	IF(IX.EQ.1)INODE=
	1 NX(1) # (NY(1) +1)+1+
	S WX(S)+(IA-1)+WX(S)
	TELTY-EO. MYP) INONE:
	1 NX(1)*(NY(1)+1)+1+ 2 NX(2)*(NY(2)+1)+
	3 NX(3)
	MOECT (IXY, IS) *INODE
280	CONTINUE
290	CONTINUE
C	
	MLAST=MODER
C	
	IF (NPYLON-EQ. 8) GO TO 39;
	IS=IS+1
	- 1253 xH-8xH
	HYP=HY (IS) +1
	DO 348 IY-1,4YP
	DO 388 IX=1,NXP
C	
	IF(IX.50.4.AND.IX.CT.4) -0 TO 385
	IF(IX.EQ.NXP)GO TO 385
	NODER-MODERAL
385	CONTINUE
	INODE-NODES
	IF(IX.EQ.1) INODE=
	1 HUASTAL
	IF(IX.EQ.NXP) INODE= NX(1) *(NY(1)+1) +1+NYP-(IY-1)
380	NOFCT (IXY, IS) = INODE CONTINUE
100	CONTINUE
	NLAST=NODEQ
c	
	IF(KSYMMZ.NE.0)60 TO 499
	TE (MR ODY1 - ED. A) GO TO 422
	IS=IS+1
	NXP=NX(IS)+4
	HYP=HY(IS)+1
	DO 446 TY-1,NYP
	00 488 IX=1,4XP
	IXYEIX+(IY-1) FNXP

	IF(IX.EQ.1) 30 TO 485	
	IFITY EQ.NYP) GO TO AAS	
	NODE 0 = NODE 0+1	
-445	CONTINUE	
	INODE =NODE &	
	TECTY-EO-1)THOOE=1	
	IF (IX.NE.1.AND.IY.EQ.NP) INODE=	
	1 NX(1)*NY(1)+TX	
	NOFCT (IXY, IS) = INODE	
	CONTINUE	
499	CONTINUE	
	NLAST = NGDE 0	-
<u> </u>		
	IF(KSYMMZ.NE.D) GO TO 573	
	TE (NB 0072-EQ. 8 160 TO 5 99	
	142742	
	NXP=NX(IS)+1	-
	I+ (2)) YM=QYM	
	00 580 IY=1,4YP	
	DO SAG TY=1,NYP	
	IXY=IX+(IY-1) *NXP	
	IF(IX.EQ.1)G) TO 585	-
	IFILY EQ NYP) GO TO SAS	
	NODE G=NODE G+1	-
545	CONTINUE	
	INODE = NODE 0	_
	TELTY ED 1 AND TY NE NYT) INCOE	
	1 NLAST-NX(1)*(NY(1)-2)-(YX(1)-1)-1+(IY-1)*NX(1)	_
	TELTY FOLL AND TY FO MY LINODES	
	1 NX(1)*(NY(1)+1)+1	
	TELTY . EQ. NYP. AND . IY . NE . 1) I NODE=	
	1 NX(1)*(NY(1)+1)+1+	
	2 NY (2) PNY (2) 01 ATY	
	NOFCT (IXY, IS) = INODE	
SAG	CONTINUE	
599	CONTINUE	
-	NI ACT AND DEC	_
	NLAST=NODEO	
	TE (KEYMMZ, NE. 8) CO. TO. 603	_
	IF(NBODY3.EQ.0) GO TO 699	
	NXP=NX(IS)+1	_
	MAG=WA (12) V4	
	DO 668 IY=1,4YP	_
	NO 448 77=1,478	
	IXY=IX+(IY-1) *NXP	
-	IF(IX.EQ.1) 30 TO 685	-
	IF (IV-EQ.NYP) GO TO GAS	
	IF(IX.EQ.NXP)GO TO 685	_
	MODER-MODERAL	
685	CONTINUE	_
	INCOF *NOOF R	
		_

	1 NLAST-NX(2)* (NY(2)-2)-(1X(2)-1)-1+(IY-1)*NX(2) IF(IY-EQ-NYP-AMD-(IX-NE-1-OR-IX-NE-NXP)) INODE=
	1 NX(1)*(NY(1)+1)+1+
	2 HX(2) 4 (HX(2) 41)4
	3 (NX(3)-1)*NY(3)+1+(IX-L)
	IF(IX EQ-MXP) INODE-
	1 NX(1)*(NY(1)+1)+1+
	3 NX(3)
	-IF(IX.EQ.1 .AND. IX.EQ.W(A) INODE
	1 NX(1) *(NY(1)+1)+1+NX(2) *(NY(2)+1)
	HOFCT (IXY, IS) +IHOOE
688	CONTINUE
C	CONTINUE
•	NLAST=NODE0
	NODET=NLAST
	IF (HYTATL FO B) GO TO 79
	IS=IS+1
	NXP=NX (IS) 41
	NYP=NY(IS)+1
	00 788 IY=1,NYP
	DO 788 IX=1,NXP
C	***************************************
	NO DE BANODE BAL
	INODE=NODES+NLAST
	HOFCT (IXY, IS) = IHODE
788	CONTINUE
790 C	CONFINUS
	NI ASTANGOER
	IF(KSYMMY.NE.O) GO TO 833
	IF (N800Y1.EQ.8) 60 TO 89:
	IS=IS+1
	NXB=NX (25) *4
	NYP=NY(IS)+1
	00 886 IX=1.NXP
	IXY=IX+(IX-1) =NXP
C	
	IF(IX.EQ.1) 50 TO 985
	IF (IY.EQ.1) GO TO 885
	MODER=NODER+1
565	CONTINUE
	INCOE=NODES IF(IX.EQ.1)INODE=1
	TELLA EU TIMODE-LA
	NOFCT (IXY, IS) = I NODE
880	CONTINUE
899	CONTINUE
	NLAST=NODET
	TE(KEANNA-NE-U) CO LO 6:5
	IF (NB 0072.EQ. 0)60 TO 999
	1421=21
	NXP=NX(IS)+1

	NYP=NY (IS) +1
	KPYL 1s1
	KPYL2=2
	K1=KPYL1+2
	KS=K1+NX(+)-S
	00 944 IV-1,4VP
	00 986 IX=1,4XP
	IAA=IX=(IA-4) anxo
C	TE (MPYLON-ME. 0) GO TO 953
	IF(IX.EQ.1)GD TO 985
	TE(TY-E0.1)ED TO 985
	NODE 0 = NODE 0+1
	CONTINUE
	I NODE = NODE 0
	TE(TY.EQ.1)TWODE:
	NLAST-NX(1)*(NY(1)-1)-(NX(1)-1)-1+(IY-1)*NX(1)
	TELTY EN ANTHONES
	NX(1)*(NY(1)+1)+1+(IX-1)
	TELTY-FO-1-AND-TY-FO-1)[NODE=
	NX(1)+1
	GO TO 949
	CONTINUE
	TE(TY.E0.1) :0 TO 951
	IF(IY.EQ.1.AND.(IX.LT.M.OR.IX.GT.K2)) GO TO 951
951	CONTINUE
,,,	INCOFENCIOES
	IF(IX.EQ.1) INODE=NLAST-4X(1) *(NY(1)-1) -(NX(1)-1)-1+(IY-1)*NX(1
	IFITY-EQ.1-AND-CTX-LT-M-OR-TX-GT-K211 THOOG-
-	NX(1)*(NY(1)+1)+1+(IX-L)
	TELTY EQ. LAND TY EQ. LITHODE NX(1) 41
949	CONTINUE
	NOFCT (IXY, IS) = INOOE
980	CONTINUE
699	CONTINUE
C	
	NLAST=NODED
	IF(KSYMMY.NE.8) GO TO 1039
	LE (NBOCY3, EQ. 8) 60 TO 1803
	IS=IS+1
	14 (2T) YH=QYH
	MYP=MY(IS) +1
	DO 1888 TYRIONYP
	00 1888 IX=1, NXP
	IXYETY+(IY-1) PHXP
C	
	TELTY-50-1)63 TO 1845
	IF(IY.EQ.1)60 TO 1085
	TELTY FO MYPIGO TO 1885
	NODE 0 = NODE 0+1
1085	CONTINUE
	INCOE = NODEO
	TE (11 . EQ. 4) THODE-
	NLAST-NX(2)*(NY(2)-1)+([Y-2)*NX(2)
	TEITY-ED-1) THORE

	IF(IX.EQ.1.AND.IY.EQ.1)INODE=
	IF(IX.EQ.NXP) INODE=
	1 HX(1) F(HY(1) 41) 414
	2 NX(2) * (NY(2) +1) +NX(3)
1888	CONTINUE
C	
	NLAST=NODE8
	IF(KSYMMY.NE.8) GO TO 1139 IF(MBYLON.EO.8)GO TO 1193
-//	IS=IS+1
	HXP=HX(IS) 41
	NYP=NY(IS)+1 DO 1188 IV=1. NYP
	DO 1160 IX=1, NXP
	IXA-IX+(IA-7) anxo
С	IF (TY.FO. 1) 5) TO 1185
	IF(IX.EQ.1.0R.(IX.EQ.NX"))GO TO 1165
	IFIZY.EQ.NYPIGO TO 1185
1185	NODE 0=NODE 0+1
	IN ODE =NODEO
	IFITY ED. 11 INDRESHODEUS.
	IF (IX.EQ.1) INODE=NODEU+1 IF (IX.EQ.NYR.ANG.IX.NE.1) INODE=NODEU+1+(NXR-2) +(NYR-1)+1+(IX-
	IF (IX.EQ.NXP) INODE=NLAST - (NX(3)-1) *NY(3) -NX(2) *NY(2) +1-(IY-1)
	TRITE EQ.1.AND. IX. EQ. NY) INCOE=NX(1) F(NY(1) ALANY(4) AL
	IF(IY.EQ.NYP.AND.IX.EQ.\(P)INQDE=4X(1)*(NY(1)+1)+1+1 NOECT(IXY.TS)=INQDE
1180	CONTINUE
1100	CONTINUE
С	NI AST-MODER
	IF(KSYMMZ.NE. 0) GO TO 1239
	IF (MBODY1. FQ. 8) GO TO 1233
	IS=IS+1 NXP=NX(ISIA)
	NYP=NY (IS) +1
-	DO 1288 IX=1, NXP
	TXX=TXA(TX~1) =NXP
C	
	IF(IX.EQ.1)G) TO 1285
	15/17 -50 HV91 CO TO 1245
1285	NODES=NODES+1
	INCOE=NODE0
	IF(NPYLON.EG. 0) PSS=1.
	15(855.EQ.1.)60 TO 1295
	IF(IX.EQ-1) INODE=1
	TELLY HE 1 AND TY EQ 1 N NODES

	: (NX(4)-1)=(NY(4)+1)+[X IF(TX-NE-1-A40-IY-FQ-NY2)INODE=MLAST-
-	NX(4) * (NY (4) -1) - (NX (3) - 1) *NY (3) -
	WY(2) THY (2) WY (1) 4 (1X=1)
	60 TO 1250
1291	CONTINUE
	IF (IX.EQ.1) INODE=1
-	TELTY-NE-1-AND-TY-EQ-1)! NODE
	TE(IX-ME-1-AND-IY-EQ-MY) INODE=
	NO DEU+NX(1) PNY (1)+NX (2) 7 47 (2)+ (NX (3)-1)*NY (3)+
	WY (1) T (WY (1) -1) 6 (TY-1)
1250	CONTINUE
	NOECT (TXY, IS) = INOOF
1280	CONTINUE
	CONTINUE
С	NA 407-NARCE
	IF(KSYMMZ.NE.0)GO TO 1393
	IF (MBODY2-FO, 0) GO TO 1333
	IS=IS+1
	MY PENY (TS) 41
	HYP=HY(IS)+1
	DO 1380 TYPI, NYP
	DO 1388 IX=1, NXP
C	Tryatty tree
·	TEITY . EQ. 1363 TO 1385
	IF(IX.EQ.1)G) TO 1385
	IFITY-EO-NYPIGO TO 1345
	NODE 0 = NODE 0+1
1385	CONTINUE
	I NODE = NODE 0
	IF (MPYLON.EQ. 0)PSS=1.
	TE (855-EQ-1-) GO TO 1390
	IF(IX.EQ.1.AND. (IY.NE.1.)R.IY.NE. YP)) INODE=
	MLAST-NX(1) + (NY(1) -2) + [Y-2) +NX(1)
	IF (IX.EQ.1.ANO. IY.EQ.1)(YOUE=
	NODEU (MX(A) -1) = (MY (A) +1) A1+MX(1)
	IF (IX.67.1.A40.IY.EQ.1); 40DE=
	L NOTEUA (NY (A) - E) P (NY (A)AL) ASA
	2 MX(1)*MY(1)*(IX-1) IE(IX-EG-1-AND.IY-EQ-MY2) INODE*
	1 NLAST-NX(1)*(NY(1)-1)-NX(6)*(NY(6)-1)-
	2 (NY (3)-1) 9NY (3)-NX (2) 9N((2)
	IF (IX.GT.1.AND.IY.EQ.NYO) INODE=
	L MLAST-MY(L)P(MY(L)-L)-
	5 (MX(+)-1)+(MA(+)-1)-(MX(3)-1)+MA(3)-
	T MY (2) 4 (1X-4)
	60 TO 1350
	IF(IX.EQ.1.AND.(IY.NE.1 OR.IY.NE.YP)) INODE=
	L NI AST-MX(1)-(NX(1)-1)-(A-(2Y-2)-NX(1)
	2 +HX(1)
	TELTY-EQ-1-AND-TY-EQ-1)T NODER
	1 NODEU+NX(1)

	IF(IY.EQ.1.AND.IX.NE.1)[NODE=
	IF(IX.EQ.1.AND.IY.EQ.NY") INODE=
	L NLAST-NX(1) # (NX(1)-1)-(1) X+)-(1) XH-12) XH-12AJH (1)
	IF (IX.HE.1.AND.IY.EQ.NY=) INODE=
	
1350	CONTINUE MOECT (IXY, IS) *INODE
30 0	CONTINUE
199	CONTINUE
	NLAST=NODE®
	IS=IS+1
	NYPANY (IS) 41
	NYP=NY(IS)+1
	DO 1488 IY=1, NYP
	00 1488 IX=1, NXP
	IXA-IX-(IA-1) +HXB
	IF(TX-FQ-1)G) TO 1485
	IF(IY.EQ.1)60 TO 1485
	IF(IV.EQ.NYP) GO TO 1485
	IF(IX.EQ.NXP)GO TO 1485
485	MODES=NODESA1
403	INODE SHODE O
	PSS=0.
	IF INPYLON-EQ. 81 PSS-1-
	IF (PSS.EQ.1.) 60 TO 1498
	IF (IX.EG. 1) INODE-NUAST-
	L NX(2)+(IY-2)*NX(2) IF(IX-FD-1-AND-IY-FD-1)INODEx
	NODEU+ (NX (4) -1) * (NY (4)+1) +1+
	MY(1) PNY(1) ANY(2)
	IF(IX.NE.1.AVO.IY.EQ.1)! NODE=
	MODEUA (NX (A) -1) P (NY (A) -1) A1 ANX (1) PNY (1) A
	2 NX(2) PNY(2)+(IX-1)
	IF(IY_FQ_MYP_AMQ_IX_EQ_1) INCOF# 1 NLAST-NX(2)*(NY(2)-1)-((1)*(NY(1)-1)-
	2 (MX(Y)=1) 4(MX(Y)=1)=4(1) 4(MX(1)=1)=
	3 +NX(3)
	IRILY . EO. NYP. AND . IY. NE. LI THODE -
	1 NLAST-NX(2)*(NY(2)-1)-4((1)*(NY(1)-1)-
	2 (NY (A)=1) = (NY (A)=1) = (NY (3)=1) + ([X=1)
	IF (IX.EQ.NXP) INODE=
	GO TO 1458
1400	CONTINUE
	IF (IY.EQ.1) INODE=
	MODERANX(1)PHY(1)ANX(2)PHY(2)A(EX-1)
	IF (IY. EQ.NYP) INODE=
	1 NLAST-NY (2) F (NY (2) -() -((1) F (NY (1) -() -NY (3) A [Y
	IF (IX.EQ.NXP) INODE=
	IF(IX.EQ.1)INODE=
	MLAST-NY (2) - (NY (2) -1) -1+ (TY-2) PHY (2)
	2 +NX(2)

	IF(IX.EQ.1.A40.IY.EQ.1)[NODE=
	IF(IX.EQ.1.AND.IY.EQ.NYP) INODE=
	L MLAST-MX (2) P (MY (2) - 1) - MX (1) P (MY (1) - 1) - (MX (3) - 1) P MY (3)
1450	CONTINUE MORCTLINY, ISI *I MODE
488	CONTINUE
499	CONTINUE
	NLAST = NODE 0
	IF (NYTAIL . SO. 8) 60 TO 153
	IS=#\$+1 NYP=MY / 752 +1
	HYP=NY (IS) +1
	NO 15AB TYRI, NYP
	00 1588 IX=1, NXP
	IXY=IX+(IY-1) PHYP
	TELTY - FD. 1 - OR - IX - FD. NYB - CO - TO - 1515
	IF(IY.EQ.NYP) GO TO 1585
	NODER = NODER+1
585	CONTINUE
	I NODE = NODE 8
	IF(IX.EQ.1)INODE=
	IF (IX.EQ.NXP) INODE=
	1 MODET+1+NX(8)+(TY-1)+(V((A)+1)
	IF (IY.EQ.NYP) INODE=
	NOSETA (MY (8) A1) PNY (8) AT Y
540	NOFCT (IXY, IS) = I NODE
599	CONTINUE
	NLAST=NODEQ
	MROUA-NODEU
	IF(NSHAFT.EQ.0) GO TO 16-3
	1421+21
	NXP=NX(IS)+1 NYP=NY(IS)+1
	DO 1688 IY=1, NYP
	00 1648 IX-1-NYP
	IXY=IX+(IY-1) *HXP
	NODE #= NODE #+1
	I MODE = NODE = Y
	NOFCT (IXY, IS) = INODE
648	CONTINUE
699	CONTINUE
	NLAST=NODE0
	TECKSYMMY.NE.B) GO TO 1739
	IF(NSHAFT.EQ.0) GO TO 177)
	NXP=NX(IS)+1
	MAG-WA(22) AT
	00 1788 IY=1,NYP
	IXY=IX+(IY-1) * NXP

IF(IY.FQ.1.02.IY.FQ.NYP) 30 TO 1745	
NODES=NODES+1	
CONTINUE INCOE = NODE 0	-
1 NBODY+ (NX(IS)+1) =NY(IS+IX	
HOFCT (IXY, IS) - INODE	
CONTENUE	
NI 487-MAREA	
TRATEAL	
MXP=MX(IS)+1	
HAB-WA(12) VE	
00 1880 IY=1, NYP	
IXY=IX+(IY-1) *NXP	
TE (TW. FO. 1. AVO. TV. GT. 1)GO TO 1885	_
CONTINUE	
INCOERNOCES	
IF (IX.EQ.1) INODE=NLASTM	
HOFCT (IXY, IS) = INODE	
CONTINUE	
MI ASTRONASTRA	
IS=IS+1	
HYF-MY (IS) AS	-
TECTE - SO. 1 - AND TY - GT - 43+3 TO 1085	
IF (IX.EQ.NXP) GO TO 1985	
NO DER ANODE 4-1!	
3 NX(47) -(NY(97) 45) 41 41	
IF CIR.EQ.NXP INODE=NBODY+	
1 (NYLIS)AI) PINYLIS)AI)A	
2 (NX(16)+1)*(NY(16)-1)+	
	I MODOY = IX 1 MODOY = IX MODOY = IX 1 MODOY = IX MINISTRATION = IX MOSCI (IXY, IS) = IMODE CONTINUE CONTINUE CONTINUE MLASTAMODES IF (MMUB.EQ. 8) SO TO 1899 IS=ISA! MY=MX (IS) +1 MY=MX (IS) +1 MY=MX (IS) +1 MY=MX (IS) +1 MY=MX (IX + IXP DO 1888 IY=1, MYP DO 1888 IY=1, MYP IF (IX .EQ. 1. AND. IY . ST - 1 MG) TO 1885 MODESAMODESA! IF (IX .EQ. 1) NODE=MLASTM MODESAMODESA! IF (IX .EQ. 1) NODE=MLASTM MODESAMODES IF (IX .EQ. 1) NODE=MLASTM MODESAMODES IF (IX .EQ. 1) NODE=MLASTM MASSAMODES IF (IX .EQ. 1) NODE=MLASTM MASSAMODES IF (IX .EQ. 1) NODE MASSAMODES IF (IX .EQ. 1) NODE MY=MY (IS) +1 MY=MY (IS)

C	
	MLAST=NODER
	IF(KSYHMY.NE. 0) GO TO 2199
	IF (HHIIB. EQ. 8) 60 TO 2899
	IS=IS+1
	NY DEN X (TS) 41
	NYP=NY (IS)+1
	DO 2000 TWO NYP
	00 2000 IX=1, NXP
C	[XA=[X+(]A-1) ouxb
•	TE (TY - FO - 1) 60 TO - 204 S
	IF(IY-EQ-1-QR-IY-EQ-NYP) 30 TO 2005
2085	
2003	INORENORES
	IF(IX.EQ.1) INODE=NBODY+
	- INVISENTATION OF THE PROPERTY OF THE PROPERT
	2 (NX (16)+1)*(NY (16)-1)+
	IF(IY.EG.1.AND.IX.NE.1)[YODE=
	1 MBODY+(MX(15)+1)*(MY(1)+1)+
	2 (NX(16)+1)*(NY(16)-1)+
	1.11
	IF(IY.EQ.NYP.AND.IX.NE.1) INODE=
	1 MRODY+(MX(15)+1)*(MY(1,)+1)+
	2 (MX (16)+1)*(NY (16)-1)+
	3 HX(17) CHY(17) AIX
	NOFCT (IXY, IS) = INODE
2000	CONTINUE
2899	CONTINUE
	NLAST=NODE8
	IF (KSYNNZ.NE.8) GO TO 2139
	IF(NHUB.EQ.C) GD TD 2199
	TSETSA1
	HXP=HX (IS) +1
	NYPENY (TS) 41
	DO 2180 IY=1,NYP
	DO 2140 TY-S NYP
	IXY=IX+(IY-1) *NXP
	IF(IX.EQ.1)60 TO 2185
	TEITY-EQ-1-02-TY-EQ-MY9 SO TO 2185
	IF(IX.EQ.NXP)GO TO 2185
	MODES=MODES+4
2185	
	T MODE = MODE #
	IF(IX-EQ-1) ING DE=MBG DY+
	1 (MX(15)+1)*(MY(15)+1)+
	S (HX (16)+1) P(HY (16)-1)+
	3 MX(47)-0MY(47)-41-44-
	TELTY-EQ-1-AND-TY-ME-11ENODE=MOODYA
	1 (NX (15) +1) P(NY (15) +1) +
	7 (MY(16)+1)*(MY(16)-1)+ 3 NX(17)*(NY(17)+1)+1+

	LECTRICO MAD AND TO ME INTROOP-MADON
	IF(IY:EQ.HYP. AND.IX.ME.L) INODE=H800 YA. 1 (NX(15)+1)*(NY(15)+1)+
	2 (NX (16) 01) 3 (NY (16) 01) 0
	3 NX(17) *(NY(17) +1) +1+
	A (NY (14)-1) AMY (14) (14)
	IF (IX.EQ.NXP) INODE=NBODY+
	1 (NX (15) 41) P(NY (15) 41) 4
	2 (NX(16)+1)*(NY(16)+1)+
	3 HX(LT)S(HY(LT)AL)ALA
	4 (NX(18)-1)*(NY(18)+1)+(+
	5 NX(10)A(1Y-2) PNX(10)
	IF (IX.EQ.NXP. AND.IY.EQ.NYP) INODE=
	1 MBODY+
	2 (NX(15)+1)*(NY(15)+1)+
	3 (NX(16)a1)*(NX(16)a1)a
	4 NX(17)*(NY(17)+1)+1
	IF (IX . 60 . NXP. AND . I Y . 60 . 1 \ INOUS =
	1 NBODY+
	Z (NX (15)+1)*(NY (15)+1)+
	3 (NX(16)+1)*(NY(16)-1)+X(17)
	4-41
	NOFCT (IXY, IS) = INODE
2150	CONTINUE
2199	
-	NLAST=NODE0
	TE (MSMANK, EQ. 0.)50 TO 2233
	IS=IS+1
	LA (21) YHERYM
	NYP=NY (IS) +1
	DO 2288 TY=1, NYP
	DO 2288 IX=1, NXP
	IXY=IX+(IX+1) FHXP
C	
	TELTY FO MYPIGO TO 2285
	NODE 8 = NODE 8 +1
2285	CONTINUE
	IN ODE = NODE 0
	IF ITY .EQ. MYP) INORE :NLAST . IX
	NOFCT (IXY, IS) = INODE
2288	CONTINUE
2299	CONTINUE
<u>c</u>	
	NLAST=NODEO
	IF (NBLADE, EQ. 8) GO TO 2303
	IS=IS+1
	MX8=MX(122) *4
	NYP=NY (IS) +1
	DO 2340 TY=1, NYP
	DO 2380 IX=1, NXP
	TXY=TX=(TY=1) SHYP
C	
	NODE 8=NODE 841
	IN CDE=NODE 0
	NOFCT (TXY, ISI = TNODF

NLAST=NODE0	5399	CONTINUE
IF (NBLADE.EQ. 8) GO TO 24:3 IZ=ISAL NXP=NX(IS)+1 NYP=NX(IS)+1 NYP=NX(IS)+1 NYP=NX(IS)+1 NYP=NX(IS)+1 NYP=NY(IS)+1 DO 2480 I Y=1, NYP DO 2A83 IX=1, NXP IXY=IX+(IY-1)*NXP IF(IX.EQ.1.0R.IX.EQ.NXP) GO TO 2485 IF(IX.EQ.NYP) GO TO 2485 NODE =NODE 8 INODE =NODE 9 IX IX - EQ. 1) INODE =NLAST - NXP*NYP+1*(IY-1)*NXP*NX(IS) IF (IX.EQ.NXP) INODE =NLAST - NXP*NYP+1*(IY-1)*NXP*NX(IS) IF (IX.EQ.NXP) INODE =NLAST - NXP*NYP+1*(IY-1)*NXP*NX(IS) IF (IX.EQ.NYP) INODE =NLAST - NXP*NYP+1*(IY-1)*NXP*NX(IS) NAP =NX(IS)*1 NXP=NX(IS)*1 NXP=NX(IS)*1 NXP=NX(IS)*1 NXP=NX(IS)*1 NODE =NODE 9 IF (IY.EQ.NYP) GO TO 2585 NODE =NODE 9 IF (IY.EQ.NYP) INODE =NLAST = IX NOPET (IXY, IS) = INODE SAG		NLAST=NODE®
IS=IS+1 MYP=MY(IS)+1 MYP=MY(IS)+1 DO 2+00 I Y=1, MYP DO 2+00 I Y=1, MYP DO 2+00 I Y=1, MYP IF (IX = Eq.1.0R.IX = Eq. MYP = 0 TO 2+05 IF (IX = Eq.1.0R.IX = Eq. MYP = 0 TO 2+05 IF (IX = Eq.1.0R.IX = Eq. MYP = 0 TO 2+05 IF (IX = Eq.1.0R.IX = Eq. MYP		IF (KSYMMZ.NE. 8) GO TO 2439
NXP=NX(IS)+1 NYP=NYP DO 2484 Y=1,NYP DO 2484 X=1,NYP DO 2485 IX IX IX IX IX IX IX I		IF (NBLADE.EQ. 8) GO TO 24:3
MYPAMY(IS)+1 DO 2888 I*=1,NYP DO 2888 IX=1,NYP IXY=IX+(IY-1)*NXP IF(IX.EQ.1.0R.IX.EQ.MXP 30 TO 2885 IF(IY.EQ.NYP)GO TO 2885 NODE =NODE 8+1 LECTY.EQ.INDE= INODE =NODE 8 IF(IX.EQ.NXP)INODE= INODE =NODE NODE = NLAST-NXP*NYP+1+(IY-1)*NXP*NX(IS) IF(IX.EQ.NXP)INODE=MLAST-NXP*NYP+1+(IY-1)*NXP*NX(IS) IF(IX.EQ.NXP)INODE=MLAST-NXP*NYP+1+(IY-1)*NXP*NX(IS) IF(IX.EQ.NXP)INODE=MLAST-NXP*IX NOFCT (IXY, IS) = INODE NLAST=NODE 8 MIEMP=MODE 8 IF(IXHANK.EQ. 0) GO TO 2593 IS=IS=1 NXP=NX(IS)*1 NYP=NX(IS)*1 DO 2588 IY=1,NYP IXY=IX+(IY-1)*NXP IF(IY.EQ.NYP)GO TO 2585 NODE SANDE SAN		ISEISAL
DO 2688 I V=1, NYP		
DO 2AAA IX=1, MXP IXY=IX+(IY-1) *MXP IF(IX.EQ.1.OR.IX.EQ.MXP) 30 TO 2685 IF(IY.FD.MYP) GO TO 26A5 NODE @=NODE@+1 LASS CONTINUE INCOE=NODE@ IF(IX.EQ.MXP) INCOE=NLAST-NXP*NYP*1*(IY-1) *NXP*NX(IS IF(IX.EQ.MXP) INCOE=NLAST-NXP*NYP*1*(IY-1) *NXP*NX(IS IF(IX.EQ.MXP) INCOE=MLAST-NXP*NYP*1*(IY-1) *NXP*NX(IS IF(IX.EQ.MXP) INCOE MOFCT (IXY, IS) = INCOE MIEMP=NODE@ IF(NSHANK.EQ.@) GO TO 2593 ISAISA1 NXP=NX(IS) *1 MYP=NX(IS) *1 MYP=NX(IS) *1 MYP=NX(IS) *1 MYP=NX(IS) *1 NODE RANCHER* INCOE RANCHER* INCOE RANCHER* INCOE RANCHER* INCOE RANCHER* INCOE CONTINUE SAG CONTINUE NOFCT (IXY, IS) = INCOE IS-IS*1 MYP=NX(IS) *1 NYP=NX(IS) *1		MYPANY (IS) 41
IXY=IX+(IY-1) *MXP IF(IX.EQ.1.0R.IX.EQ.MXP 30 TO 2485 IF(IY.EQ.MYP)GO TO 2485 MODE = NODE 8 IMODE = NODE 8 IF(IX.EQ.MYP)GO TO 2485 1 NLAST-NXP*NYP*(IY-1) *NX> IF(IX.EQ.MXP)INODE=MLAST-MXP*NYP*1*(IY-1) *NXP*MX(IS) IF(IX.EQ.MXP)INODE=MLAST-MXP*IX MOFCT (IXY, IS) = INODE MAR CONTINUE NLAST=NODE 8 MTEMPANODE 0 IF(IX HANK.EQ. 0) GO TO 2593 ISAISA1 MXP*MX (IS) *1 MYP*MX (IS) *1 MYP*MX (IS) *1 IF(IY.EQ.MYP) GO TO 2585 MODE BANDE 80 IF(IY.EQ.MYP) TMODE=MLASTAIX MOFCT (IXY, IS) = INODE SAG CONTINUE INODE MODE 8 IF(IY.EQ.MYP) TMODE=MLASTAIX MOFCT (IXY, IS) = INODE MLAST=NODE 8 IF(IY.EQ.MYP) TMODE=MLASTAIX MOFCT (IXY, IS) = INODE MLAST=NODE 8 IE(IXY.EQ.MYP) TMODE=MLASTAIX MOFCT (IXY, IS) = INODE IE(IXEQ.MYP) TMODE 8 IE(IXEQ.MYP) TMODE 9 IE(IXEQ.MYP) TMODE 9 IE(IXEQ.MYP) TMODE 1		
IF(IY.FQ.NYP)GO TO 2845 NODE G=NODE8+1 LASS COMTINUE INODE =NODE8 IF(IY.FQ.1)INODE= 1 NLAST-NXP*NYP+(IY-1)*NX> 1 +1 IF(IX.EQ.NYP)INODE=NLAST-NXP*NYP+1+(IY-1)*NXP.NX(IS IF(IY.FQ.NYP)INODE=NLAST-NXP+IX NOFCT(IXY, IS) = INODE NLAST=NODE8 NIEMP=NODE8 IF(NSMANK.EQ.8)GO TO 25) IS=ISA1 NXP=NX(IS)+1 NYP=NX(IS)+1 NYP=NX(IS)+1 IXY=IX+(IY-1)*NXP IXY=IX+(IY-1)*NXP IF(IY.EQ.NYP)GO TO 2585 NODE SENODE8 IE(IY.EQ.MYP)THODE=NLAST+IX NOFCT(IXY, IS) = INODE SAS CONTINUE INODE =NODE8 IE(IY.EQ.MYP)THODE=NLAST+IX NOFCT(IXY, IS) = INODE SAG CONTINUE NLAST=NODE8 IE(IY.EQ.MYP)THODE=NLAST+IX NOFCT(IXY, IS) = INODE IE(IXAST=NODE8 IIII IIII IIII IIIIIII IIIIIIIII		
IF(IY.FQ.NYP)GO TO 2845 NODE G=NODE8+1 LASS COMTINUE INODE =NODE8 IF(IY.FQ.1)INODE= 1 NLAST-NXP*NYP+(IY-1)*NX> 1 +1 IF(IX.EQ.NYP)INODE=NLAST-NXP*NYP+1+(IY-1)*NXP.NX(IS IF(IY.FQ.NYP)INODE=NLAST-NXP+IX NOFCT(IXY, IS) = INODE NLAST=NODE8 NIEMP=NODE8 IF(NSMANK.EQ.8)GO TO 25) IS=ISA1 NXP=NX(IS)+1 NYP=NX(IS)+1 NYP=NX(IS)+1 IXY=IX+(IY-1)*NXP IXY=IX+(IY-1)*NXP IF(IY.EQ.NYP)GO TO 2585 NODE SENODE8 IE(IY.EQ.MYP)THODE=NLAST+IX NOFCT(IXY, IS) = INODE SAS CONTINUE INODE =NODE8 IE(IY.EQ.MYP)THODE=NLAST+IX NOFCT(IXY, IS) = INODE SAG CONTINUE NLAST=NODE8 IE(IY.EQ.MYP)THODE=NLAST+IX NOFCT(IXY, IS) = INODE IE(IXAST=NODE8 IIII IIII IIII IIIIIII IIIIIIIII	•	
IF(IY.FQ.NYP)GO TO 2845 NODE G=NODE8+1 LASS COMTINUE INODE =NODE8 IF(IY.FQ.1)INODE= 1 NLAST-NXP*NYP+(IY-1)*NX> 1 +1 IF(IX.EQ.NYP)INODE=NLAST-NXP*NYP+1+(IY-1)*NXP.NX(IS IF(IY.FQ.NYP)INODE=NLAST-NXP+IX NOFCT(IXY, IS) = INODE NLAST=NODE8 NIEMP=NODE8 IF(NSMANK.EQ.8)GO TO 25) IS=ISA1 NXP=NX(IS)+1 NYP=NX(IS)+1 NYP=NX(IS)+1 IXY=IX+(IY-1)*NXP IXY=IX+(IY-1)*NXP IF(IY.EQ.NYP)GO TO 2585 NODE SENODE8 IE(IY.EQ.MYP)THODE=NLAST+IX NOFCT(IXY, IS) = INODE SAS CONTINUE INODE =NODE8 IE(IY.EQ.MYP)THODE=NLAST+IX NOFCT(IXY, IS) = INODE SAG CONTINUE NLAST=NODE8 IE(IY.EQ.MYP)THODE=NLAST+IX NOFCT(IXY, IS) = INODE IE(IXAST=NODE8 IIII IIII IIII IIIIIII IIIIIIIII		IF(IX.EQ.1.0R.IX.EQ.NXP) 30 TO 2485
INDE=NODE8 INDE=NODE8 IF(IX.EQ.NXP)INODE=NLAST-NXP*NYP+1*(IY-1)*NXCIS IF(IX.EQ.NXP)INODE=NLAST-NXP*NYP+1*(IY-1)*NXCIS IF(IX.EQ.NYP)INODE=NLAST-NXP*NYP+1*(IY-1)*NXCIS IF(IX.EQ.NYP)INODE NOFCT(IXY, IS) = INODE NLAST=NODE8 NIEMPANODE0 IF(NSHANK.EQ.0)GO TO 25)3 IS=ISA1 NXP=NX(IS)*1 NYP=NX(IS)*1 NYP=NX(IS)*1 NYP=NX(IS)*1 NYP=NX(IS)*1 IXY=IX*(IY-1)*NXP IF(IY.EQ.NYP)GO TO 2585 CONTINUE INODE=NODE0 IE(YX.EQ.NYP)INODE=NLAST*IX NOFCT(IXY, IS) = INODE NLAST=NODE8 IE(YX.EQ.NYP)INODE=NLAST*IX NOFCT(IXY, IS) = INODE IS=IS*1 NXP=NX(IS)*1		
I NODE = NODE 8		NODE 0=NODE 0+1
I NODE = NODE 8	2445	CONTINUE
1 NLAST-NXPONYP+(IY-1)*NX> 1 +1 IF (IX - EG.NXP) INODE=NLAST-NXPONYP+1+(IY-1)*NXP-NX(IS IF (IY-EQ.NYP) INODE=NLAST-NXP+IX NOFCT (IXY, IS) = INODE MAR CONTINUE NLAST=NODE8 MIEMPANODEA IF (NSHANK. EQ. 8) GO TO 259 3 IS=ISA1 NXP=NX(IS)+1 NYP=NX(IS)+1 NYP=NX(IS)+1 NYP=NX(IS)+1 NYP=NX(IS)+1 NYP=NX(IS)+1 NODE 25A8 IX=1,NYP IXY=IX+(IY-1)*NXP IF (IY-EQ.NYP) GO TO 2585 CONTINUE INODE=NODE8 IE (YY-EQ.NYP) INODE=NLASTAIX NOFCT (IXY, IS) = INODE NLAST=NODE8 IE (YY-EQ.NYP) INODE=NLASTAIX NAPANX(IS)+1 NYP=NY(IS)+1 NYP=NY(IS)+1 NYP=NY(IS)+1 NYP=NY(IS)+1 NYP=NY(IS)+1 NYP=NY(IS)+1 NYP=NY(IS)+1 NYP=NY(IS)+1		
1 NLAST-NXPONYP+(IY-1)*NX> 1 +1 IF (IX - EG.NXP) INODE=NLAST-NXPONYP+1+(IY-1)*NXP-NX(IS IF (IY-EQ.NYP) INODE=NLAST-NXP+IX NOFCT (IXY, IS) = INODE MAR CONTINUE NLAST=NODE8 MIEMPANODEA IF (NSHANK. EQ. 8) GO TO 259 3 IS=ISA1 NXP=NX(IS)+1 NYP=NX(IS)+1 NYP=NX(IS)+1 NYP=NX(IS)+1 NYP=NX(IS)+1 NYP=NX(IS)+1 NODE 25A8 IX=1,NYP IXY=IX+(IY-1)*NXP IF (IY-EQ.NYP) GO TO 2585 CONTINUE INODE=NODE8 IE (YY-EQ.NYP) INODE=NLASTAIX NOFCT (IXY, IS) = INODE NLAST=NODE8 IE (YY-EQ.NYP) INODE=NLASTAIX NAPANX(IS)+1 NYP=NY(IS)+1 NYP=NY(IS)+1 NYP=NY(IS)+1 NYP=NY(IS)+1 NYP=NY(IS)+1 NYP=NY(IS)+1 NYP=NY(IS)+1 NYP=NY(IS)+1		TE(TY_EO_1) TNODE=
1 1 1		
IF(IY-EQ.NYP) INODE MLAST-NXP+IX NOFCT(IXY, IS) = INODE MAR CONTINUE NLAST=NODE8 MIEMPANODEA IF(NXMANK.EQ.8) GO TO 2593 IS=IS=1 NXP=MX(IS) +1 NYP=MY(IS) +1 NODE SANDOFA +1 IF(IY-EQ.NYP) GO TO 2585 NODE SANDOFA +1 INODE NODE8 IE(IY-EQ.MYP) INODE -NLASTAIX NOFCT(IXY, IS) = INODE SAN CONTINUE NOFCT(IXY, IS) = INODE NLAST=NODE8 IE(NBLADE-EQ.R) GO TO 2593 IS=IS+1 NYP=MY(IS) +1 NYP=MY(IS) +1 NYP=MY(IS) +1 NYP=MY(IS) +1		
IF(IY-EQ.NYP) INODE MLAST-NXP+IX NOFCT(IXY, IS) = INODE MAR CONTINUE NLAST=NODE8 MIEMPANODEA IF(NXMANK.EQ.8) GO TO 2593 IS=IS=1 NXP=MX(IS) +1 NYP=MY(IS) +1 NODE SANDOFA +1 IF(IY-EQ.NYP) GO TO 2585 NODE SANDOFA +1 INODE NODE8 IE(IY-EQ.MYP) INODE -NLASTAIX NOFCT(IXY, IS) = INODE SAN CONTINUE NOFCT(IXY, IS) = INODE NLAST=NODE8 IE(NBLADE-EQ.R) GO TO 2593 IS=IS+1 NYP=MY(IS) +1 NYP=MY(IS) +1 NYP=MY(IS) +1 NYP=MY(IS) +1		IF (IX . EQ . NXP) INODE =NLAST - NXP+NYP+1+(IY-1) +NXP -NX(YS)
MOFCY (IXY, IS) = INODE MAR CONTINUE NLAST=MODER MIEMBAMODER IF (MSMANK.EQ. 0) GO TO 2533 IS=ISA1 NXP=NX (IS) 01 MYP=NX (IS) 01 MYP=NX (IS) 01 DO 2588 IY=1, NYP DO 2588 IX=1, NXP IXY=IX+(IY-1) *NXP IXY=IX+(IY-1) *NXP IF (IY.EQ.NYP) GO TO 2585 MODERNNODER01 C SAS CONTINUE INODE=MODER IE (YY.EQ.NYP) INODE=MLASTAIX NOFCY (IXY, IS) = INODE SAG CONTINUE NOFCY (IXY, IS) = INODE IE (MRLADE-EQ. 0) GO TO 2493 IS=IS+1 NXP=NY (IS) +1 NYP=NY (IS) +1 NYP=NY (IS) +1 DO 2688 IY=1, NYP		
MAR CONTINUE NLAST=NODE8 MIEMPANODE0 IF (NSHANK.EQ. 0) GO TO 25) 3 IS=ISA1 NXP=NX(IS) 01 MYPANY/IS) 01 NYPANY/IS) 01 DO 2588 IX=1, NXP IXY=IX+(IY-1) *NXP IF (IY.EQ.NYP) GO TO 2585 NODE SANODER01 C SAS CONTINUE INODE =NODE8 IF (IY.EQ.NYP) INODE =NLASTAIX NOFCY (IXY, IS) = INODE SAG CONTINUE SAG CONTINUE SAG CONTINUE SAG CONTINUE SAG CONTINUE NOFCY (IXY, IS) = INODE IE (MALAST=NODE8 IE (MALAST=NODE8 IE (MALAST=NODE8 IE (MALAST=NODE8) IS=IS+1 NYP=NY(IS)+1 NYP=NY(IS)+1 NYP=NY(IS)+1		
NLAST=NODE8 NIEMPANODED IF (NSMANK.EQ. 8) GO TO 2593 IS=ISAL NXP=MX(IS) *1 NYP=MY(IS) *1 IXY=IX*(IY-1) *NXP IF (IY.EQ.NYP) GO TO 2585 NODE BANDDE B *1 INODE =NODE B *IE (IY-EQ.NYP) INODE =NLASTAIX NOFCY (IXY, IS) = INODE SAG CONTINUE SAG CONTINUE SAG CONTINUE SAG CONTINUE INLAST=NODE B *IE (IX ADE = IX	2140	
NLAST=NODE8 MIEMPANDED IF (NSHANK.EQ. 0) GO TO 25) 3 IS=ISA1 NXP=NX(IS) 01 MYPANY/IS) 01 DO 2588 IY=1, NYP DO 2588 IX=1, NXP IXY=IX+(IY-1) *NXP IF (IY.EQ.NYP) GO TO 2585 NODE SANDER 01 INODE SANDER 01 IS=IS+1 NYP=NY(IS)+1 NYP=NY(IS)+1 DO 2680 IY=1, NYP	2499 C	
IF (NSHANK.EQ. 8) GO TO 2593 IS=ISA1 NXP=NX(IS) +1 NXP=NX(IS) +1 NYP=NY(IS) +1 NO 2568 IY=1, NYP DO 2568 IY=1, NYP IXY=IX+(IY-1)*NXP IXY=IX+(IY-1)*NXP IF (IY.EQ.NYP) GO TO 2585 NODE RANDDER#1 I NODE RNODE 8 I NODE NODE 8 I NODE NODE 8 I NODE NODE 8 I NODE NODE 9 I NODE NODE		NLAST=NODES
IS=ISA1		MTEMPANODER
NXP=MX(IS) 01 MYPHMY(IS) 01 DO 2588 IY=1, MYP DO 2588 IX=1, MXP IXY=IX+(IY-1) *NXP IF(IY.EQ.NYP) GO TO 2585 NODE SANODER01 INODE SANODER01 INODE =NODER IF(IY.EQ.MYP) IMODE=MLASTAIX NOFCY (IXY, IS) = INODE SAN CONTINUE SAN CONTINUE MLAST=NODER IE(MRLADE-EQ.R) GO TO 2593 IS=IS+1 NYP=MY(IS)+1 DO 2688 IY=1, MYP		IF (NSHANK. EQ. 0) GO TO 2593
MYP=MY(IS)+1 00 2588 IY=1,NYP 00 2588 IX=1,MXP IXY=IX+(IY-1)*NXP IF(IY.EQ.NYP) GO TO 2585 NODE DANODE DATE INODE =NODE B IF(IY-EQ.MYP) INODE=MLASTAIX NOFCY (IXY, IS) = INODE SAG CONTIMUE SAG CONTIMUE NLAST=NODE B IE (NOLADE-EQ.D) GO TO 2593 IS=IS+1 MYP=MY(IS)+1 DO 2680 IY=1,MYP		1921921
DD 2588 IY=1, NYP		NXP=NX(IS) +1
DO 2588 IX=1, MXP IXY=IX+(IY-1)*NXP IF (IY.EQ.NYP) GO TO 2585 NODE RENODER 01 CONTINUE INODE = NODE 0 IE (IY.EQ.NYP) INODE = MLASTAIX NOFCT (IXY, IS) = INODE SAG CONTINUE SAG CONTINUE HLAST=NODE 0 IE (MALADE.EQ.0) GO TO 2603 IS=IS+1 NYP=NY(IS)+1 NYP=NY(IS)+1 NO 2680 IY=1, MYP		NYPany (IS) +1
IXY=IX+(IY-I)*NXP IF(IY-EQ.NYP) GO TO 2585 NODE BANDERS: C SAS CONTINUE		DO 2588 IV=1,NYP
IF(IY.EQ.NYP) GO TO 2585 NODE GRNODE GO TO 2585 C SAS CONTINUE INODE = NODE O IF(IY.EQ.NYP) INODE = MLASTAIX NOFCY (IXY, IS) = INODE SAN CONTINUE NLAST = NODE O IE (NOLADE = EQ. 0) GO TO 2493 IS=IS+1 NYP=NY(IS)+1 NYP=NY(IS)+1 DO 26AN IY=1,NYP		DO 2540 IX-1, NYP
NODE SENDOF Set C SAS CONTINUE INODE = NODES IF (IY = EQ = MYP) INODE = MLASTA IX NOFCT (IXY, IS) = INODE SAG CONTINUE MLAST = NODES IF (MSLADE = EQ = 0) GO TO 2603 IS = IS +1 NYP = NY (IS) +1 DO 26AG IY=1, MYP		IXY=IX+(IY-1) *NXP
NODE SENDOF Set C SAS CONTINUE INODE = NODES IF (IY = EQ = MYP) INODE = MLASTA IX NOFCT (IXY, IS) = INODE SAG CONTINUE MLAST = NODES IF (MSLADE = EQ = 0) GO TO 2603 IS = IS +1 NYP = NY (IS) +1 DO 26AG IY=1, MYP		
C SAS CONTINUE INODE=NODES IF(TY=EQ_MYP) INODE=NLASTAIX NOFCY(IXY, IS) = INODE SAG CONTINUE NLAST=NODES IE(NBLADE=EQ_D) GO TO 2493 IS=IS+1 NYP=NY(IS)+1 DO 26AD IY=1,NYP		IF(IY.EQ.NYP) GO TO 2585
SAS CONTINUE INODE=NODES IF(IY-EQ-MYP) INODE=NLASTAIX NOFCY (IXY, IS) = INODE SAG CONTINUE NLAST=NODES IF(MBLADE-EQ.S) GO TO 2603 IS=IS+1 NYP=MY(IS)+1 DO 26AS IY=1,MYP		NODE BANGDER +1
INODE = NODE 8 IF (TY = FO, MYP) INODE = M(ASTAIX NOFCT (IXY, IS) = INODE SAO CONTINUE S99 CONTINUE MLAST = NODE 8 IF (MBLADE = FO, B) GO TO 2603 IS = IS + 1 MYP = MY (IS) + 1 DO 26AO IY=1, MYP	CC	
IF(TY-EQ.MYP) INQUE-NLASTAIX NOFCY(IXY, IS) = INODE SAG CONTINUE NLAST=NODES IE(NSLADE-FQ.S)GO TO 2493 IS=IS+1 NYP=NY(IS)+1 NYP=NY(IS)+1 DO 26AG IY=1,NYP	2585	CONTINUE
NOFCT (IXY, IS) = INODE SAG CONTINUE NLAST=NODES IF (NBLADE, EQ. 0) GO TO 2603 IS=IS+1 NXP=NX(IS)+1 NYP=NY(IS)+1 DO 26AS IY=1,NYP		INODE = NODE 8
SAO CONTINUE NLAST=NODES IE (MBLADE, EQ. 8) GO TO 2603 IS=IS+1 NYP=MY(IS)+1 DO 26AS IY=1, MYP		TELTY-EO-MYPI THODE-MLASTATY
599 CONTINUE NLAST=NODE0		
NLAST=NODES IE (MBLADE-EQ. 8) GO TO 2403 IS=IS+1 NXP=MX(IS)+1 NYP=MY(IS)+1 DO 26AS IY=1, MYP	25A0	
IE (MBL ADE, EQ. 6) GQ TQ 2603 IS=IS+1 NYP=MY(IS)+1 DO 26AG IY=1, MYP	2599	CONTINUE
IE (MBL ADE, EQ. 6) GQ TQ 2603 IS=IS+1 NYP=MY(IS)+1 DO 26AG IY=1, MYP	<u></u>	
IS=IS+1		NLAST=NODE0
NYP=MY(IS)+1 NYP=NY(IS)+1 DO 26A0 IY=1, MYP		TE (NEL ADE. EQ. A) CO TO 2603
NYP=MY(IS)+1 NYP=NY(IS)+1 DO 26A0 IY=1, MYP		IS=IS+1
NYP=NY(IS)+1 DO 2640 IY=1,NYP		
DO 2680 TYRI, NYP		
DO 2644 IX=1.NXP		DO 2684 IX=1, HXP
TYY=TYA(TY=1) \$NYD		
	C	
NODER SNODER +1!	•	NODER SNODER +1!
I NODE = NODE 0		

2648	NOFCT (IXY, IS) = INODE
2699	CONTINUE
	NLAST=NODE8
	1F1HBLADE.EQ. 81 CO TO 2713
	IS=IS+1
	MYPANY(TS)AL
	NYP=NY (IS)+1
	00 2788 TV-1, NYP
	DO 2788 IX=1, NXP
C	
	IF(IX.EQ.1.02.IX.EQ.NXP :0 TO 2785
	IF (IY . EQ .NYP) GO TO 2765
	NODE S=NODESAS
2785	CONTINUE
	I NORE - NORE
	IF(IX.EQ.1)INODE=NLAST-NXP*NYP+(IY-1)*NXP
	IF (IX.EQ.NXP) INODE=NLAST-NXP+NYP+1+(IY-1) +NXP+NX(IS)
	IFITY-EQ-HYPI INOCE-HLAST-HXP-IX
	NOFCT (IXY, IS) = I NODE
2788	CONFINUE
2799	CONTINUE
	NODE=NLAST
CC_	NOCE-NEAS!
CC	
-	
	IF (KSYMY. EQ. 0) NSYMY=1
	IE (KZANNA-NE- O) NZANNA=S
	IF (KSYHMZ.EQ. 0) NSY4H Z=1
C	TE (KEAWE'NE' 8) HEANNS - S
•	NNORE - NCRER
	WRITE (6.4800)
	FORMAT(/18X,6MPREPRO)
	WRITE (6.4001) NNODE
-4001	FORMAT (5X, SHINNODE = TE)
	00 100 IS=1,4S
	HXP=HX (35) A1
	HYP=HY(IS)+1
	00 188 TY=1,NYP
	DO 188 IX=1,NXP
	INVESTIGATIVES TO THE TO HAPPET COME
100	WRITE (6, 200) IS, IX, IY, IXY, NOFCT (IXY, IS)
208	FORMAT (2X, *IS =*, IS, 2X, *1 X=*, IS, 2K, * IY =*, IS, 2X, *IXY=*, IS, 2X
	PNOFCTA (15)
	ENG
	(0.0 E. 20.50 (0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0

	SUBROUTINE GEOMET (NELEM, NXYMP, NOFCT, NO DE, XK, NTNODE, KMAKE, KROTOR)
C	2501990 999
	COMMON/7771/4X (3A) .NY (3A) .NXY (3A) .K SYH NY .KSYMNZ .NSYMNY .NSYMNZ
	COMMON/ZZZZ/NSFX, NSBODY, NS.NT (34), I SFACE (34), KNORHL (34), KHAKES (34)
	COMMON/2223/NRYLON.NBODY L. NBODY Z. NBODY Z. NYTAZL.NSHAF T. NHUB. NSHANK
	1 NBLADE
	COMMON/ZZZA/UMACH, OMEGA, ALFA, ABETA
	COHHON/ZZZ5/XPYCTR,YPYCTR,ZPYCTR,RXPYL,RYPYL,RZPYL
	COMMON/ZZZ6/XHOSE, XBD1, X3D2, XTASU
	COMMON/ZZZ7/YNOSE, YBU1,/3D2, YTAIL
	COMMON/277A/2NGSE, ZBO1,ZBO2,ZTAEL
	COMMON/ZZZ9/RY8D1, RZ8D1, RY8D2, RZ8D2
	COMMON/77710/RSHAFT, LSH. FT, RSHAMK, LSHAMK
	COMMON/ZZZ11/X HUBCR, YHU3 CR, ZHUBCR, R XHUB, RYHUB, RZHU9
	COMMON/27712/820TOR, SCHOOL, TAUSL, ALFAS
	COMMON/ZZZ13/THET75, THET1C, THE T1S, CONING, AZIMUTH
	COMMON ZZZIA WOLADE, TAM . S. TAMTES, XBLE, XBTE, KROTORS (SA)
	COMMON/ZZZ15/YSPAN,XLEZY,XTEZY,TANLEY,TANTEY,TAU,ZYTAIL
	COMMON/ZZZ17/WAKLPY, WAK. 18, WAKLSK, WAKLBL
	COMMON/2221//WAREPT, WARE 48 HANGSK, WARE BE
	COMMON/ZZZ19/KPRINT(10), NREAD, NWRITE, KREAD
	COMMON/77720/PT
	COMMON/ZZZZ1/KPY1,KPY2
	COMMON / 77722/KN SEL F. KNST 4P. KNSTYP
	COMMON/ZZZ 23/KBDELE, KBDS 1P, KBDTYP
	COMMON/7772A/KTNELE, KTNE 48, KTNTYS
	COMMON/ZZZ 25/KPYELE, KPY5 1P, KPY TY>
	COMMON /ZZZZS/KUTELE, KYTS AP, KYTTYP
	COMMON/ZZZZ7/KSHELE, KSHSHP, KSHTY?
	COMMON/27728/KH8ELE, KH8SHP, KH8TYP
	Common/zzz29/kskele, ksks+p, ksktyp
	COMMON/22230/KBLELE, KBLS 4P, KBLTYP
	COMMON/ZZZ 31/NSTAG, NYORT, NSPIRAL, SPIRAL
	DINENSTON KROTOR(NELEN)
	DIMENSION_XK(3,NTNODE),10FCT(NXMP,34),KMAKE(NELEM),NODE(4,NELEM)
	REAL LSHAFT LSHANK
C	
c	MOU-NO
	NSH=NS
	NHALF-NELFN
	DO 1999 IS=1, NSH ISFIX=ISFAGE(IS)
	NXX=NX (IS)
	MXD=MXX41
	NYY=NY (IS)
	TO 999 TYPE MYY
	DO 999 IY=1.NYY
C	50 777 A1-A9411
C	
	IELENATY-MY/IC)-FITY-1)-AIT(IC)
	IF(KNORML(IS).EQ1)GO TO 986
C	••
<u> </u>	

	IXMM=IX
	IXMP=IX
	IVERIVAL
	IYHH=IY
A Section	TYPHETY
	TYPP=TY+1
	TYMORTYAL
C	
	50 70 967
986	CONTINUE
c	
C	
	TYMMETY
	IXMP=IX
	TYPOSTYAS
	IXPM=IX+1
	I YHME TY41
	IYHP=IY
	TYPPETY
	IYPM=IY+1
987	CONTINUE
C	
	IXYPP=IXPP+(IYPP-1)*NXP
	IXYP N=IXPN+(IYP N-1) *NXP
	I YYMP=[XHP+(IYMP-1) +NXP
	IXYMH=IXMH+(IYMH-1)+NXP
	NODE(1, IELEM) =NOFCT(IXY: >, IS)
	NODE (2, TELEM ANDECT (TXY- N. IS)
	NODE (3, IELEM) =NOFCT (IXY4 P, IS)
	NODE (A. IELEM = NOFCT (IXM 4. IS)
	KWAKE (IELEH)= 0
	KROTOR (IELEM = 8
	IF (KHAKES (IS) . GT.O.AND K. EQ.NXX) KHAKE (IELEH) = 1
	IE/ROTORS(IS).ME.O) KR. FOR(IELEY).1
	WRITE (6,58) IS, IELEH, NOTE (1, IELEH), NODE (2, IELEH), NODE (3, IELEH),
	L NODE (A, TELEN), KMAKE (TELEN), KROTJR(TELEN)
	FORMAT(5X, "IS=",15,2X,"TELEM=",15,2X, "NODE1=",15,2X, "NODE2=",1 L 2X. \$MODE3== L5.2X. \$MOD: A=0.15.2X. \$MMAKE=0.15.2X. \$KROTOR=0.15.
С	
999	CONTINUE
1999	CONTINUE
c	WRITE (6.60)
40	FORMAT(10Y, Town FMD OF STONET
	RETURN
	FND

C	SUBSOLITINE WEC 123 (NELEM. MODE . A C. 21 . AZ . A3 . XK. NNOOE)
	COMMON/ZZZ 1/NX (34), NY (3.), NXY (34), KSY HY, KSYMZ, NSYMY, NSYMY
	COMMON/ZZZZ/NSFX, NSBODY, NS, NT(BA), LSFACE (BA), KNORM, (BA), KHAKES (BA)
	COMMON/ZZZ3/NPYLON, NBODY1, NBODY2, NBODY3, NYTAIL, NSHAFT, NHUB, NSHANK,
	1 NBLAGE
	COMMON/ZZZ4/UMACH, OMEGA, ALFA, ABETA COMMON/ZZZ5/XPYCTR, YPYCTR, ZPYCTR, RXPYL, RXPYL, RZPYL
	COMMON/ZZZ6/XNOSE, XBD1, X 302, XTAIL
	COMMON / 2777 / YNOSE , YBO1 / 302 , YTAIL
	COMMON/ZZZ8/ZNOSE, Z801, 2802, ZTAIL
	COMMON/2779/24801, 27801, 24802, 27802
	COMMON/ZZZ10/RSHAFT, LSHAFT, RSHANK, LSHANK
	COMMON/27711/YHU9CZ, YMUBCR, ZMUBCZ, RXHUB, RYHUB, RZHUB
	COMMON/ZZZ12/RROTOR, SCHORD, TAUSL, ALFAS
	COMMON / 7771 T / THETTS, THET LC. THE TIS, CONTING, AZINUTH
	COMMON/ZZZ14/KBLADE, TANLEB, TANTEB, XBLE, XBTE, KROTORS (34)
	COMMON/ZZZ16/NS PAM, XLEZ/, XTEZV, TANLEY, TANTEY, TAU, ZYTAIL COMMON/ZZZ16/NHAKFY, NMA(48, NMAKSK, NMAKBL
	COMMON/77717/WWKL PY NAK 18 MAKL SK MAKL SK
	COMMON/ZZZ18/WANGPY, WANG 48, WANGSK, WANGBL
	COMMON / TZZ1 9/ KPRINT (10), MREAD, NMALTE, KREAD
	COMMON/ZZZ20/PI
	COMMON/ZZZ31/KPY1,KPY3
	COMMON/ZZZZZ/KNSELE,KNSS+P,KNSTYP
	COMMON/ZZZZZ/KBDELE, KBDS 48, KBDTYP
	COMMON/ZZZZ4/KTNELE, KTNS1P, KTNTYP
	COMMON/27725/KPYELE, KPYCHP, KRYTYP
	COMMON/ZZZ 26/KYTELE, KYTS1P, KYTTYP COMMON/ZZZZZ/KSHELE, KSHS4P, KSHTYP
	COMMON/ZZZZ6/KHBELE, KHBS 4P, KHB TYP
	COMMON/77729/KSKFLF, KSKS-4P, KSKTYP
	COMMON/ZZZ30/KBLELE, KBL91P, KBLTYP
	COMMON/ZZZ31/NSTAG, NVORT, NSPIRAL, SPIRAL
	DIMENSION XK(3, NNODE), NODE (4, NELEM)
	DIMENSION BC(3, NELEM), PL(3, NELEM), P2(3, NELEM), P3(3, NELEM)
	REAL LSHAFT, LSHANK
	ALFAR=ALFA+3,14159/160.
	COSALF=COS(ALFAR)
	DETA-CORT (ARE (1 - ALMACHRIMACH))
С	
	BET#ARETAP3.14159/188.
	SINBET=SIN (BET)
	COSSET-COS (SET)
C	
	00-108-1H00E-1, NHOOE
	XK1=XK(1,INO)E)
	XX38XX(3,TNO)E)
	XK(1, INODE)=(XK1*COSALF+KK3*SINALF)/BETA XK(3, INODE)=-XK1*SINALF+(K3*COSALF
	WRITE(6,61)INODE,XK1,XK3
	FORMATICAL TIMORES TEST TEST TEST FOR SELECTION OF THE SE
100	CONTINUE
	DO 181 THORES, NHORE
	XK1=XK(1.INO)E)

	XK2=XK(2,INODE) XK(1,INODE)=KK1+GOSBET+KC2+SINBET	
10	XK(2, INODE) =- XK1*SINBET+ KZ*COSBET	
(10	00 208 IELEM=1, NELEM	
	YPP=XK(K,NOTE(1,IELEH)) YPH=XK(K,NOTE(2,IELEH))	
	YHH=XK(K,NODE(B, TELEM))	
	PC(K, IELEH) = (YPP+YPH+YPP+YHH)/4.	
	P2(K, IELEM)=(YPP-YPM+YMP-YMM)/4. P3(K, IFLEM)=(YPP-YPM-YMP+YMM)/4.	
199	CONTINUE	
508	CONTINUE	
6	WRITE (6,60)	
	RETURN FND	

C	SOCOODO SUBROUTINE PRINTA DODO DO DOCUMENTO DE CONTRE DE
	SUBROUTINE PRINTA (NELEM, NXYMP, XK, NNODE, PC, NOFCT, NODE, NPRINT)
	COMMON / 7771/VX (36) - NY (36) - NXY (36) - KSY MNY - KSYMNZ - NSYMNY - NSYMNZ - NS
	COMMON/7722/NSFX.NSBODY. 45.NT(34).ISFACE(34),KNORHL(34),KNAKES(34)
	COMMON/ZZZZ/MPYLON, MOOOF 1, MOOOFZ, HOOOFZ, NYTAZL, NSHAFT, HHUB, NSHANK,
	1 NOLADE
	COMMON/2274/UMACH, ONEGA ALFA, ASETA
	COMMON/ZZZS/XPYCTR, YPYCTR, ZPYCTR, RXPYL, RYPYL, RZPYL
	COMMON/2275/XNOSE, X901,X302,XTATL
	COMMON/ZZZ7/YNOSE, Y8D1, / 3D2, YTAIL
	COMMON/2728/ZNOSE, 2801,/202, ZTATL
	COMMON/ZZZ9/RY9D1, RZBD1, RY8D2, RZ3D2
	COMMON/27710/RSHAFT, LSHAFT, RSHANK, LSHANK
	COMMON/ZZZ11/xHU8C2, YHU9CR, ZHU8CR, RXHU8, RYHU8, RZHU3
	COMMON/ZZZ12/ RROTOR, BCHT 10, TAUBL, AL FAR
	COMMON/22213/THETTS, THETLC, THETLS, CONTING, AZIMUTH
	COMMON/ZZZ14/KBLADE, TAN. IS, TANTES, XSLE, XSTE, KROTORS (34)
	COMMON/ZZZ15/VSPAN, XLEZV, XTEZV, TANLEV, TANTEV, TAU, ZVTAIL
	COMMON ZZZ 16 NHAKPY , NHAC 48 , NHAKSK , NHAKSK
	COMMON/ZZZ17/WAKLPY, WAK +3, WAKLSK, WAKL BL
	COMMON /ZZZ18/HANGPY, HAN: 18, HANGSK, HAN SEL
	COMMON/ZZZ19/ KPRINT(10), WREAD, NMRITE, KREAD
	COMMON/77720/PT
	COMMON/ZZZZ1/KPY1,KPYZ
	COMMON /777.22/KN SELE, KNSS 4P, KNS TYP
	COMMON/ZZZZ3/KBDELE, KBOS 1P, KBOTYP
	COMMON/72724/KTNELE, KTNS 4R, KTNTY2
	COMMON/ZZZZS/KPYELE, KPYS 1P, KFYTYP
	COMMON/77728/KVTELE, KVT: 4P, KVTTVP
	COMMON/ZZZZZ/KSHELE, KSH51P, KSHTYP
	COMMON / 7772 8/K H8ELE, KH83 1P, KH8TYP
	COMMON/ZZZZ9/KSKELE, KSKS HP, KSKTYP
	COMMON/22230/KBLELE, KBLS1P, KBLTYP
	COMMON/ZZZ31/NSTAG, NVORT, NSPIRAL, SPIRAL
	DIMENSION PC(3, NELEN), YC(3, NNODE), NOECT(NYYMP, 34), NODE (4, NELEN)
	REAL LSHAFT, LSHANK
	GO TO (1,2,3,4), NPRINT
	CONTINUE WRITE (NWRITE, 118)
	IS FORMATICALLY PROFESTED ON OF THE PROBLEM BY
	00 112 II=1,NS TF(NXY(TT).EQ.D)GO TO 112
	WRITE (NWRITE, 113) ISFACE: II)
	MRITE (MMRITE, 114) MX(III), MY(II)
11	
	WRITE (NURITE, 115) NELEN, CSYMMY, KSYMMZ, REFLEN, SPAN, TAU,
	TALFA, ALFARC, IMACH, 1777
	114 FORMAT (2x, "Nx = ",12,/2x,"4Y=",12/)
	115 FORMAT (/2X, *NEL EME*, 13//2X, *KSYMNY= , 1 2/2X, *KSYMNZ=+, 12//
	1 2X, TREFERENCE LENGTH =*, F6.2/2X, TSPAN =*, F6.2/ 1 2Y, THING THECKNESS=*, F3.8/2X, PALFA = *, F7.3/2X, PALFASC =*, F7.3/
	1 ZI PUTNG THE UNIVERSAL PLANT AND
	1 2X, *MACH NUMBER =*, F7.3//2X, * IZZZ=*, I5//)
	MRTTF (MMRTTE, 116)TAMGLE, TAMGTE, CHORD, R 116 FORMAT (2X, "TAMGLE=", F6.?/2X, "TAMGTE=", F6.2//2X, "CHORD =", F6.2
	446 ENDMAY 194 STANCIESS.ES.7/74.9TANKIPET.BR.2//CA.T(M)VI) STAPD 16

	1 //2x, PRADIUS = P, F6. 2) RETURM
2	CONTINUE
222	FORMAT(//4X,*NODE=*,4X,*(*,10X,*Y*,10X,*Z*//) 00 2218 INODE=1,4MODE
2210	WRITE (NWRITE, 221) INODE, ((K(K, INODE), K= 1, 3) FORMAT (4X, I4, 3 (1X, £1,0.5))
220	CONTINUE
1	CONTINUE MRITE SAGE
340	FORMAT (////1x, *ELEH=*, %, *XPC*,7x, *YPC*,7x, *ZPC*) 00 366 1=1,NELEM
144	WRITE (NWRITE, 345) I, (PC(K, I), K=1,3) FORMAT(1X-13-12F13-5)
	RETURN
- 41	WRITE(NWRITE,41) FORMATIC/5X,*MODAL NUMBERING FOR SURFICES*//)
	00 % IS=1,NS MXF=MX(IS)+1
	NYP=NY (IS) +1
	MRITE(NMRITE, 46) ISFACE(.5) DO 66 IXEL, NCP
	HRITE (NHRITE, 45) (NOFCT ("XY, IS), IXY= IX, NXYP, NXP) CONTINUE
- 16	FORMAT (1116) FORMAT (/5X, PFOR SUGFACE P, 15/)
67	WRITE (NWRITE, 47) FORMAT (//5%, 4000AL NUMBERING FOR ELEMENTS4//)
	HRITE(NHRITE, 49) DO AA IELEM=1.MELEM
.8	WRITE (NMRITE, 45) IELEM, (NODE (ICORNR, IELEM), ICORNR=1,4) FORMAT (//2X,*ELEM*,&X,*+4+,&X,**+4+,&X,**+4+,&X,***+4+,&X,***+4+,&X,***********************************
	RETURN

C	ASSESSES SUBROUTINE TERUS ASSESSES ASSESSES ASSESSES
C	The second secon
	SUBBOUTINE DEBUGEE
	COMMON/ZZZ19/KFRINT(10), WREAD, NWRITE, KREAD
1	FORMAT(/2x,* ERROR CO): * *, I6/)
	END

	AAAAAAAA SUBROUTINE PRINTE AAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
c	
	SUBROUTINE PRINTO (NELEM, 4ESO, A A, SJURGE, NPRINT) COMMON/2221/44/(34), MY(3.), MY(3.), KSY444, KSYMMZ, MSYMMY, MSYMMZ
	COMMON/ZZZZ/NSFX,NSBODY, 45,NT(34), ISF4CE(34),KNORML(34),KNAKES(34),COMMON/ZZZZY/NRYLON,MSODYS,NBODYZ,NBODYZ,NYTAIL,NSNAKT,NMUB,NSNANK,
1	NOLADE COMMON/ZZZA/UMACH, JNEGA, ALFA, ABETA
	COMMON/ZZZS/XPYCTR, YPYCTR, ZPYCTR, RXPYL, RYPYL, RZPYL
	CO MON / 2776 / XNOSE XBDS X303 XTATL
	COMMON/2227/Y NOSE, YB01,/302, YTAIL
	COMMON/2778/ZNOSE.7801.7302.7TAIL
	COMMON/2229/37901.RZ801.37802.RZ802
	COMMON/22716/RSHAFT, LSM FT, RSHANK, LSHANK
	COMMON/ZZZ11/XHU3CR, YHU3 CR, ZMU8GR, RXHU8, RYHU3, RZHU3
	COMMON/22712/880TOR, SCHORD, TAUBL, ALFA 3
	COMMON/22213/THETTS, THETLG, THETLS, CONLING, AZIMUTH
	COMMON/22214/KBLADE, TAN EB, TANTEB, XBLE, X 3TE, KROTOKS (34)
	COMMON/22215/VSPAN,XLEZV,XTEZV,TANLEV,TANTEV,TAU,ZVTAIL
	COMMON ZZZ16 / NMAKPY , NMAK 48 , NMAKSK , NWA KOL
	COMMON/ZZZ17/ HAKLPY, HAK_ +B, HAKLSK, HAKL BL
	COMMONYZZZISKMANGRY, MAN: 18, MANGSK, MANGS
	COMMON/ZZZ19 KPRINT(10). WREAD, NWRITE, KREAD
	COMMON/ZZZZ1/KPY1.KPYZ
	COMMON/22722/KNSELE, KNS: 4P, KNSTYP
	COMMON/ZZZZ3/KBDELE, K9DS 1P, KBDTY>
	COMM CH / 22224/ KT NELE, KTN: 4P, KTNTY2
	COMMON/ZZZZS/KPYELE, KPYS4P, KPYTY>
	COMMON / 727 26 / KVTEL F. KVT; 4P. KVTTY2
	COMMON/ZZZZ7/KSHELE, KSHS 1P, KSHTYP
	COMMON/ZZZZE/KHBELE, KHBSHP, KHB TYZ
	COHNON/ZZZZ9/KSKELE, KSKT HP, KSKTYP
	COMMON / 77730 / KBL EL KBL : 40 KBL TY2
•	COMMON/ZZZ31/NSTAG, NVORF, NSPIRAL, SFIRAL
	DIMENSION SOURCE(NELEM). 14 (NESQ)
	DIMENSION ABSVAL (100), FISEAN (100)
	REAL LSHAFT, LSHANK
	HAY-F 2 (NA (5) - 5)
	60 TO(1,2,3,4,5),NPRINT
	CONTINUE
	HRITE (NHRITE, 110)
	FORMATILIZE, FOISTRIBUT ON OF AALS, JO TA
	DO 11 I=1, NELEM
	MPITE (MMOITE, 111) I
	M1=I
	M7=NELEM=NELEM
111	FORMAT (2X, "INDEX =", IZ)
	MRITE (MMRITE, 112) (AA (K), Kanton 2, MELEN)
112	FORMAT (1X, SELS. 6)
	CONTINUE
	RETURN
	CONTINUE
	WRITE (NWRITE, 221)

221	FORMAT (///2X, *THE DISTR BUTION OF SOURCE*)
225	CONTINUE
	NSBTOT=0
	DO 229 IS=1,NS
	WRITE (NWRITE, 223) ISFACE(IS)
_223	FORMATI//5X, FOR SUBSUR ACE *13)
	I ND=NSETOT
	(21 YM* (21)XM+101E2M=TOTE2M
	IFIN=NSBTOT
	NX=NX(IS)
	DO 226 IX=1.4XX
	WRITE (NHRITE, 228)
	IF (NPRINT.GE.5.AND. (IX.EZ.NXX))GO TO 226
	IND=IND+1
	WRITE (NWRITE, 227) (SOURC (KK), KK=IND, IFIN, NXX)
226	CONTINUE
227	FORMAT(1X,8E15.5)
225	FORMAT (/)
229	CONTINUE
	RETURN
3	CONTINUE
	MRITE (NMRITE, 330)
330	FORMAT (///2X, *THE DISTRIBUTION OF THE VELOCITY POTENTIAL*)
	60 TO 225
4	CONTINUE
	HRITE (NHRITE. 440)
441	FORMAT (/// 2X, THE DISTRIBUTION OF CPT)
	GO TO 225
5	CONTINUE
	RETURN
	END

C	
C	
•	SUBROUTINE STLUTH (MELEM, NESO, AA, SOURCE)
C	
	COMMON / ZZZŁANY (ZA) , MY (ZA) , MYY (ZA) , KSYMM, KSYMMZ, MSYMMY , MSYMMZ
	COMMON/ZZZZ/NSFX, NSBOOY, 45, NT (34), ISFACE (34), KNORML (34), KHAKES (34 COMMON/ZZZZ/NPYLON, MBOOY L, MBOOYZ, NBOOY 3, NYTAIL, NSMAFT, NHUB, NSMANK
	1 NOLADE
	COMMON/277A/UMACH, OHEGA, ALFA, ASETA
	COMMON/ZZZ5/XPYCTR,YPYCTR,ZPYCTR,RXPYL,RYPYL,RZPYL
	COMMON/ZZZ7/YNOSE, YBD1,Y3D2,YTAIL
	COMMON/2778/7NOSE, 7BD1,7BD2, 7TATL
	COMMON/2229/37801, RZ801, 37802, RZ302
	COMMON/27718/RSHAFT, LSH\FT, RSHANK, LSHANK
	COMMON/ZZZ11/XHU9CR, YHU3 CR, ZHUBCR, RXHUB, RYHUB, RZHU3
	COMMON/22712/AROTOR, BCH 20, TAUBL, ALFA 2
	COMMON/ZZZ13/THET75, THET1C, THET1S, CONING, AZIMUTH
	COMMON/77714/KBLADE, TAM EB, TANTEB, XBLE, XBTE, KROTORS (34)
	COMMON/ZZZ15/VSPAN, XLEZV, XTEZV, TANLEV, TANVEV, TAU, ZVTAIL
	COMMON/22216/MMAKPY, NMAK48, NMAKSK, NMAKS
	COMMON/ZZZ17/ WAKLPY, WAK HB, WAKLSK, WAKLBL
	COMMON CZZZ 18/MANGRY, MANGAS, MANGSK, MANGSK
	COMMON/ZZZ19/KPRINT(10), WREAD, NWRITE, KÆAD
	COMMON/ZZZZ1/KPY1.KPY2
	COMMON / 277 22/ KNSEL E. KNSE 4P. KNSTV2
	COMMON/ZZZZ3/KBOELE, KBOS 1P, KBOTY?
	COMMON /ZZZZA/K THELE, KTNSHP, KTNTY2
	COMMON/ZZZ25/KPYELE, KPYS1P, KPYTYP
	COMMON / 277 26/ KVT FLE, KVTS 4 P, KVT TV2
	COMMON/ZZZZ7/KSHELE, KSHS+P, KSHTYP
	COHNON/7772A/KHBELE, KHBEHP, KHBTY3
	COMMON/ZZZZSY KSKELE, KSKS 4P, KSKTYP
	COMMON (77774 (METAC MACON MEGADA)
	COMMON/ZZZ31/NSTAG, NVOR, NSPIRAL, SPIRAL OTHENSION AA(NESO), SOURCE (NELEN)
	REAL LSHAFT.LSHANK
c	CLAE BOTH TYEOTHER
	IF(KPRINT(5).EQ.1) CALL PRINTB (NELEM, NESQ, AA, SOURCE, 1)
	IF (KPRINT(6) . EQ. S) CALL : SINT BUNELEM, NE ST. AA, SOURCE, 2)
	FOL=0.001
	CALL CCGELG(SOURCE, AA, NE LEN-1, TOL, EER)
C	
	IFILER.HE. BLARITE (NHRITE, 181) IER
C	IF (IER.NE.0)CALL DEBUG((001)
	FORMAT (////21, 1 TER - 1, TA///)
	IF (KPRINT (7). EQ. 1) CALL = RINTB (NELEM, NESQ, AA, SOURCE, 3)
	END
	ENU

C	SURROUTINE COGELGIR.A.M. V.EPS.TEX
C	
c	
	DIMENSION A(1),R(1)
	TS(M) 23,23,1
C	******* *** **** *** *** *** *** *** *
	SEARCH FOR GREATEST FLENENT IN MATRIX A
	PTV=0
	MM=M*M
	NHEN®M
	00 3 L=1,HM
	TAGE ARCIA(L))
	IF(T88-PIV) 3, 3, 2
	[a]
	3 CONTINUE
	TOL=EPS*PIV
	A(I) IS PINOT FLENENT. 214 CONTAINS THE ARSOLUTE VALUE OF ALT
C	
c	CTART EL THINATTON I DOC
٠	START ELIMINATION LOOP
	00 17 K=1.H
_	
C	TEST ON SINGULARITY
	IF(RIV)23,23,4
	4 IF (IER)7,5,7
	5 IF (PIV-TOL) 6,6,7 6 IER=K-1
	7 PIVIA1-/A(I)
	J=(I-1)/H
	TaTelifinek
_	J=J+1-K
<u>c</u>	I+K IS ROW-INDEX, J+K C LUNN-INDEX OF PIVOT FLENENT
	PINOT BOM REDUCTION AND ROW INTERCHANGE IN RIGHT HAND SIDE P
	DO & L=K, NM. M
	LISIAT
	T8=PIVI*R(LL)
	RULIBRUI
_	8 R(L)=T8
÷	TO EL THINATION PROMINATIO
٠	IS ELIMINATION TERMINATED
C	
	COLUMN THTERCHANGE IN MITRIX A
	9 LENG=LST+M-K
	18 II=J*H
	TO=A(L)
	A(L) #A(LL)

11 A(LL)=TB
ROW INTERCHANGE AND PINOT ROW REDUCTION IN MATRIX A
12.00.17 L=LST, HM, M
LL=L+I TB=RIWIAA(LL)
A(LL)=A(L)
13 A(U)=18
A (LST) =J
×12317-0
ELEMENT REDUCTION AND NEXT PIVOT SEARCH
LST=LST+1
DO 16 II=LST, LEND
GINI=-A(II)
IST=II+M
.18.161
DO 15 L=IST,HM.H
A(L)=A(L)+PIVI*A(LL)
TARE ARCIA(LL)
IF (TB0-PTV) 15,15,1+
15 PIVATRA
I=L
15 CONTINUE DO 16 L=K, NM, N
16 R(LL)=R(LL)+PIVI®R(L) 17 LSTALSTON
END OF ELIMINATION LOOP
BACK SUBSTITUTION AND BLCK INTERCHANCE
18 IF (M-1)23,22,19
19 ISTANNAM
LST=N+1
00 21 1=2; M II=LST-I
12-231-1 127-121-127
L=IST-H
LEALL) 4.5
00 21 J=II,NN,H
[8=R(J) LL=J
DO 38 Ketst. HH. H
LL=LL+1
28 TRATBOACK) PROLLS
KeJėL RAN eRAN
21. R(K)=78
22 AETURN
CADAD ACTION
ERAOR RETURN
23 IER#-1 RETURN

C	********* SUBROUTINE CIEFF ****************************
G	######################################
	SUBROUTINE CJEFF(NELEM,"), NNODE, KK, NOBE, KWAKE, NESQ, AA, SQURCE,
C	
C	AND FOR FLOW
	COMMON / 7774 /NY (3A) . NY (3A) . NYY (3A) . K SY NNY . KSYNNY . NSY NNY . NSY NNY . NSY NNY .
	COMMON/ZZZZ/NSFX, NSBODY, 45,NT(34),ISFACE(34),KNORML(34),KNAKES(34) COMMON/ZZZZ/NSPYLON,MBODYL,MBODYZ,MBODYZ,MBTATL,NSMAFT,MHUB,NSMANI
	1 NOLADE
	COMMON/777A/IMACH, OMEGA. ALFA, ABETA
	COMMON/ZZZS/XPYCTR, YPYCTR, ZPYCTR, RXPYL, RYPYL, RZPYL
	COMMON /7777 WHOSE YERS YERS YERS
	COMMON/ZZZZY/YNUSE, YBD1, Y3D2, YTAIL COMMON/ZZZB/ZNOSE, ZBD1, Z3D2, ZZAI!
	COMMON/ZZZ9/24801, 22801, 24802, RZ802
	COMMON/ZZZ18/RSHAFT, LSMATT, RSHANK, LSHANK
	COMMON/ZZZ11/XHUSCR, YHUI;R, ZHUBCR, RXHUB, RYHUB, RZHUB
	COMMON/77712/RROTOR, BCHO 2D, TAUBL, AL FAR
	COMMON/ZZZ 13/THET75, THET 1G, THET1S, CONING, AZIHUTH
	COMMON/27716/KRLADE, TAM ER, TANTER, XRLE, XRLE, KROTORS(34)
	COMMON/ZZZ15/YSPAN,XLEZ/,XTEZY,TANLEY,TANTEY,TAU,ZYTAIL
	COMMON/ZZZ 17/WAKLPY, WAK. 18, WAKLSK, WAKL BL
	COMMON/77718/MANGPY, MAN-48, MANGEY, MANGE
	COMMON/ZZZ19/KPRINT(16), NRÉAD, HWRITE, KREAD
	COMMON/ZZZZ1/KPY1,KPY2
	COMMON/ZZZZZ/KNSELE, KHSSAP, KNSTYP
	COMMON/ZZZZS/KBDELE, KBDS 4P, KBD TYP
	COMMON/ZZZZAKKIMELE, KEME 48, KTNIFFR COMMON/ZZZZSKKP YELE, KPY3 49, KPYTY3
	COMMON/22226/KYTELE, KYTG 4P, KYTTYP
	COMMON/ZZZZZY/KSHELE, KSHF 4P, KSHTY?
	COMMON/22230/KHOELE, KHOS 4P, KHOTYP
	Common/zzzzg/kskele, ksk5+P, ksktyP
	COMMON/72738/KBLELE, KALS 4P, VBL TVD
	COMMON/ZZZ31/MSTAG, NYORT, MSPIRAL, SPIRAL
	COMMON/ZZZZZ/CSTAG, CYORT COMMON/ZZZZZJ/UWAKE
	DIMENSION KROTOR (MELEN)
April 1949	DINENSION QV(3)
	DIMENSION YKLT, NNODE), NODE(A, MELEN),
	1PG(3, NELEH), SOURCE (NELEH), KWAKE (NELEH), AA (NESQ)
	DIMENSION A1(3,2),A2(3,2);A1A1(2),A2A2(2),QCRA1(3),QCRA2(3)
	DIMENSION A1/(3), A2V(3), 1NORH(3), UN(3), SH(3), SHUN(3), A1A2(2, 2)
	DIMENSION PZ(3),Q(3,A),Q4CRAS(3,2),QMCRA2(3,2),AA((3,2),AA((3,2)) DIMENSION VM4(3),VDD(3),VMD(3),VTEPZ(3),YTENZ(3),SIGNPT(3)
	DIMENSION AVALUED, AVASUED, ALCRASIAN, OMUE, A)
	DIMENSION MPP (3), MPM (3), 4MP (3), MM4 (3), MPC (3)
	DIMENSION ACCHELEM)
	DIMENSION YP9 (3), YPM (3), YMP (3), YMM (3)

	DIMENSION PCJ(3)
C	REAL L'SHAFT, L'SHANK
	207020144 W 24 W 22 W 22 W 24 W 24 W 24 W 24 W
3	DOTRROLX1,Y1, 21, X2, Y2, Z2) = X1=X2+Y1=Y2+Z1=Z2
•	DBAHT V/VV4 WA 774 VV2 //4 774 VV4 VV4 VV4 VV4 VV4
	PROME X (XX1, YX 1, 221, XX2, / / 3, 223, XX1, YX 3, 223) = (YX28223 = YX18223) #XX
	1 - (x x 2°273-xx3°272) + YY41+(xx2°473-xx3°472) + ZZ1
	XPROY (0X,0Y,) Z,EX,EY,ED = 0Z*EX-EZ*0X
C	X8405 (0X-0X-)S-EX-EX-EX-EX-EX-EX-EX-EX-
•	TE (UMACH, GT.4.) CALL DERIG (AGR)
•	BETA=SQRT(1UMACH**2)
C	
č	
C	
•	STGHPT(1)=1.4
C	
•	CONST = 48.5/1.16159
3	
ž	
	KOUNT=0
3	DO TAR HI, NELEH
•	KSPTP AL at
	LSFIRAL=1
	IF (ICHECK.EQ.A) KSPIRAL: SPIRAL
	IF (ICHECK.EQ. 4) LSPIRAL: YSPIRAL
	DO LAA ISPOLYKSPIRAL
	DO 188 NSP=1, LSPIRAL
_	GO TO (100,200,300,400), ICHECK
100	CONTINUE
	DO 94 K=1,3
	Abb(K) *XK(K*400E(1*1))
	YPH(K) = XK(K, NODE(2, J))
	YMP (K) = XK(K, 400E(3, J))
	YHH(K)=XK(K,NO DE(+,J))
	PCJ(K)*PCIK,J)
34	CONTINUE
	60 TO 500
500	CONTINUE
	HSTAG=1
	IF(KOUNT.EQ.1) RETURN
	READ(NREAD, 281) (YPR(K, K=1+3)
	WRITE (NWRITE, 202) (YPP(0, K=1,3)
	READ (MREAD, 2010 (YRMIN), KA1, 3)
	WRITE(NWRITE, 202) (YPM(10, K=1,3)
	READ(HREAD, 281) (YMP(K), KA1, 3)
	WRITE (NURITE, 202) (YMP(10, K=1,3)
	SEADLINGEAD, 201) (YMM(ID, K=1,3)
	WRITE (NWRITE, 282) (YMM (K ; K=1, 3)
	MRITE (NMRITE, 202) (YMM (K ; K=1, 3) DO 205 K=1,3

	KOUNT=1
	60 TO 508
268	CONTINUE
	IF COUNT. EQ. 1) RETURN
	PEAR (MEEAR, 281) (VPPIN, Vat. T)
	WRITE (NWRITE, 202) (YPP(10, K=1,3)
	READINGFAD, 201) (YPHIN , Kal, 3)
	WRITE (NWRITE, 202) (YPH (10 , K=1, 3)
	PEAD (NREAD, 281) (YMR (IO , Ka1, T)
	WRITE (NWRITE, 202) (YMP(10 , K=1,3)
	PEAN (NOFAN, 201) (YMM(K, Kal, 3)
	WRITE (NWRITE, 202) (YMM(K , K=1,3)
305	PCJ(K)=(YPP(K)+YPH(K)+Y4>(K)+YHH(K))/+.
	YOUNT #1
281	FORMAT(18F8.3)
202	FORMAT(1X, 10F8. 3)
	60 TO 500
	CONTINUE
C	NSPIRAL=1
	IF(KNAKE(J).EQ.8) GO TO 188 IF(KROTOR(J).EQ.8) GO TO 188
	DO AGA Kat-3
	YPP(K)=XK(K.NOOE(1.J))
	YPH(K)=XK(K-NODE(2-11)
	THP (K) =XK(K,NODE(3,J))
	YHH(K)=XK(X,400E(b,3))
494	CONTINUE
	RATIO=UMAKE/JMEGA PATIO=RATIO=SO./(2.4PI)
	RATIO=-1.*RATIO
	FACTOR#2. PPT/NSPIRAL
C	00 188 ISP=1, ISPIRAL
C	NO 188 NSPEL NSPERAL
	IWAKE=NSP+(ISP-1)=NSPIRA.
<u> </u>	THETA1=(IMAKE-1)=FACTOR
<u>с</u>	THETA1=(IMAKE-1) FACTOR THETA2= IMAKE PEACTOR
	THETA1=(IMAKE-1) FACTOR THETA2= IMAKE FEACTOR SIN1=SIN(THETA1)
	THETA1=(IMAKE-1) FACTOR THETA2= IMAKE PEACTOR
	THETA1=(IMAKE-1) FACTOR THETA2= IMAKE FEACTOR SIN1=SIN(THETA1)
	THETA1=(IMAKE-1)=FACTOR THETA2= IMAKE PEACTOR SIN1=SIN(THETA1) COS1=COS(THETA1)
	THETA1=(IMAKE-1) FACTOR THETA2= IMAKE PEACTOR SIN1=SIN(THETA1) COS1=COS(THETA1) SIN2=SIN(THETA2)
С	THETA1=(IMAKE-1) FACTOR THETA2= IMAKE PEACTOR SIN1=SIN(IMETA1) COS1=COS(THETA1) SIN2=SIN(IHETA2) COS2=COS(IMETA2) YRR2= YRR(1)=COS2=YRR(2)=SIN2
с - с	THETA1=(IMAKE-1)=FACTOR THETA2= IMAKE PEACTOR SIN1=SIN(THETA1) COS1=COS(THETA1) SIN2=SIN(THETA2) COS2=COS(THETA2)
С	THETA1=(IMAKE-1) = FACTOR THETA2= IMAKE PEACTOR SIN1=SIN(THETA1) COS1=COS(THETA1) SIN2=SIN(THETA2) COS2=COS(THETA2) VDD2= VDD(1)=COS2+VDD(2)=SIN2 VDD2=-VDD(1)=SIN2+YDD(2)=COS2
с - с	THETA1=(IMAKE-1) = FACTOR THETA2= IMAKE PEACTOR SIN1=SIN(THETA1) COS1=COS(THETA1) SIN2=SIN(THETA2) COS2=COS(IMETA2) VDD2= VDR(1)=COS2=VBB(2)=SIN2 VPP2=-YPP(1)=SIN2+YPP(2)=COS2 XMP1= YPP(1)=COS1+YPP(2)=SIN1
c c	THETA1=(IMAKE-1) = FACTOR THETA2= IMAKE PEACTOR SIN1=SIN(THETA1) COS1=COS(THETA1) SIN2=SIN(THETA2) COS2=COS(THETA2) VDD2= VDD(1)=COS2+VDD(2)=SIN2 VDD2=-VDD(1)=SIN2+YDD(2)=COS2
с - с	THETA1=(IMAKE-1) = FACTOR THETA2= IMAKE = PEACTOR SIN1=SIN(THETA1) SIN2=SIN(THETA1) SIN2=SIN(THETA2) VAD2= VAD(1)=COS2-VAD(2)=SIM2 VPP2=-VPP(1)=SIN2-VPP(2)=SIN1 VHP1=-VPP(1)=COS1-VPP(2)=SIN1 VHP1=-VPP(1)=SIM1-VPD(2)=COS1
c c	THETA1=(IMAKE-1) = FACTOR THETA2= IMAKE PEACTOR SIN1=SIN(THETA1) COS1=COS(THETA1) SIN2=SIN(THETA2) COS2=COS(IMETA2) VDD2= VDR(1)=COS2=VBB(2)=SIN2 VPP2=-YPP(1)=SIN2+YPP(2)=COS2 XMP1= YPP(1)=COS1+YPP(2)=SIN1
c c	THETA1=(IMAKE-1) = FACTOR THETA2= IMAKE PEACTOR SIN1=SIN(THETA1) COS1=COS(THETA1) SIN2=SIN(THETA2) COS2=COS(THETA2) VD02= VD0(1)=COS2=VD0(2)=SIM2 VPP2=-VPP(1)=SIM2+VPP(2)=COS2 XMP1= VPP(1)=COS1+VPP(2)=SIM1 YMM1= VD0(1)=COS(4)PM(2)=SIM1

	A bus=-Abu (1). 2 Ins+Ab u (S) . CO2S
	RPP2=SQRT (XPP2+XPP2+YPP2+YPP2)
	RMPL-SQRT (XMPL-XMPL-XMPL-XMPL)
	RMM1=SQRT(XMM1=XMM1+YMM =YMM1)
	ABHZ-SORT (YPHZ-XPHZ-YPHZ-YPHZ)
;	
	TE (MSP-GT-1) GO TO SAS
:	
	ZP=0.4
	ZPP2=ZP+RATIO+THETA2+RP2/RROTOR
	ZMEL-ZBAGATI3-THETAL-PRIC L/RROTOR
	ZHM1=ZP+RATIO*THETA1*RMM1/RROTOR
	ZPM2=ZP+RATI) *THE TA2 +R912 / RROTOR
-	GO TO 584
	ZPP2=ZP+RATIO*(THETA2-FACTOR)+RATIO*FACTOR*RPP2/RROTOR
	ZMR1 = ZPARATIJE (THE TA1 = FA CTOR) ARATIDEFACTOR FRMPLARROTOR
	ZHH1=ZP+RATIO+(THETA1-F-CTOR)+RATIO+FACTOR+RHM1/RROTOR
	ZPH2=ZE+PATI3=(THETA2-F-:TOR1+RATIO=FACTOR=RPH2/RROTOR
504	CONTINUE
	YPP(1)=XPP2
	Y88(2)+Y892
	YPP(3)=ZPP2
	YPH(1)=XPH2
	Y PM (2) = Y PM 2
	YPH(3)=ZPH2
	YHP(1)=XMP1
	YMP(2)=YMP1
	4HP(3)=ZMP1
	V W W A A A C V W W A
	YMM(1)=XMM1
	YMM(2)=YMM1 YMM(3)=ZMM1
	1.44.4544.5
	IF(ZPPZ.LT.(Z8D1+RZ8D1+:ZPYL))GO TO 188
	TECTOME LT. (78014RZ8014ZPYLL) 60 TO 180
;	
	00 505 Ke1,3
505	PCJ(K)=(YPP(<)+YPH(K)+Y-P(K)+YHH(K))/4.
:	
	CONTINUE
	00 1882 K=1,3
	AA1(K,1)=0.5P(YPP(K)-YMP(K))
	AA1(K, 2) =0 . SP (YPH(K) -YHH(K))
	AA2(K,1)=8.5*(YPP(K)-YP+(K))
	AA2(K,2)=0.57 (YMP(K)-YM(K))
	A1(K,1)=AA1(K,1) A1(K,2)=AA1(K,2)
	A2(K, 1)=AA2(K, 1) A2(K, 2)=AA2(K, 2)

	00 1003 L=1,2
1003	<u>A1A1(L)=D1DR0(A1(1,L),A1(2,L),A1(2,L),A1(1,L),A1(2,L),A1(2,L),A1(1,L)</u> A 2A2(L)=D0TP20(A2(1,L),A2(2,L),A2(3,L),A2(1,L),A2(2,L),A2(3,L))
	00 1004 K=1.3
	TF(A1A1(1)-E3-0-) A1(K-1) -A1(K-2)
	IF (A1A1(2) .E2.0.)A1(K, & = A1(K, 1)
	TE(A2A2(1).E).0.)A2(K.1) =A2(K.2)
	IF(A2A2(2).EQ. 0.) A2(K, 2) = A2(K, 1)
1005	CONTINUE
C	
	NO 1806 L=1,2 A1A1(L)=DOTPRO(A1(1,L),A1(2,L),A1(3,L),A1(1,L),A1(2,L),A1(3,L))
1006	A2A2(L)=001PQ0(A2(1,L)-A2(2,L)-A2(3,L)-A2(1,L)-A2(2,L)-A2(3,L))
C	
	DO 1007 L*1.2
	DO 1007 H=1,2
1007	A1A2(L,M)=DOTPRO(A1(1,L),A1(2,L),A1(3,L),A2(1,M),A2(2,M),A2(3,M)
C	
	A1GRA2(1) = SQRT(A1A1(2) = Q2A2(1) - A1A2(2,1) = +2)
	A1CRA2(2)=SQRT (A1A1(1)=A2A2(1)-A1A2(1,1)==2)
	A1CPA2(3)= SORT(A1A1(1) = 2A2(2) -A1A2(1, 2) ==2)
•	A1CRAZ (4)=SQRT (A1A1(2) 4 2A2(2)-A1A2 (2, 2) ++2)
	00 1808 K=1,3
	AVA1(K)=8-50(A1(K,1)+A1(K,2))
1078	AVA2(K)=0.5*(A2(K,1)+A2(K,2))
-	YNORM(1)=AVA1(2) +AVA2(3 -AVA1(3) +AVA2(2)
	YHORM (2) = AVAL (3) = AVAL (1) = AVAL (1) = AVAL (3)
	YNORH(3) =AVA1(1) *AVA2(2) -AVA1(2) *AV A2(1)
	Curat - washura t repres
	SN(1)=YNORM(1)/BETA SN(2)=YNORM(2)
	SN(3)=YNORM(3)
	ASM257 - TROCKET () + P245M (2) + F245M (3) + P2)
	AYN=SQRT (YNORM(1) ++2+YNORM(2) ++2+YNORM(3) ++2)
	00 1010 Ka1.3
	UN(K) = YNORM(K) /AYN
	ZNIM(K) ZSN(K) /ASN
1010	CONTINUE
	
C	DO 178 TataNELEM
C	
	DO 168 TSYMMY=1-NSYMMY
	DO 168 ISYMMZ=1.NSYMMZ
	STEMBY (2)=3.a267SYMMY
	SIGNPT(3)=32*ISYMMZ
	00 1102 K=1.3
1182	PZ(K)=PC_L(K)=PC (K-T) PS[:\PT(K)
	QDQTUN=00TPR3 (UN(1), UN(2), UN(3), PZ(1), PZ(2), PZ(3))
<u> </u>	00 1118 K=1.3
	00 1118 K=1,3 Q(K-1)=YPH(K)=PC(K-1)=S GMPT(K)

	Q(K, 3) = YHP(K) -PC(K, I) = SI GNPT(K)
1110	CONTINUE
1110	00 1111 K=1-3
	QM(K,1)=0.5*(Q(K,1)+Q(K,2))
	QM(K, 2)=0.6+(Q(K, 2)+Q(K, 3))
	QH(K, 3)=0.5+(Q(K, 3)+Q(K, 4))
	QM(K-4)=0.5P(Q(K-4)+Q(K-1))
1111	CONTINUE
<u> </u>	00 1112 K=1,3
	KD1=KA1
	KP2=K+2
	IF (KP1-GT-3)KP1=KP1-3
	IF(KP2.GT.3)(P2=KP2-3
	QMCRA1(K,1)=QM(KP1,2) *A1(KP2,1)=QM(KP2,2) *A1(KP1,1)
	QMCRA1 (K,2)=QM(KP1,4) #AL (KP2,2)-QM(KP2,4) #A1(KP1,2)
	OMCRAZ(K,1)-QM(KR1,1)+A2(KR2,1)-QM(KR2,1)+A2(KR1,1)
1112	QMCRA2(K,2)=QM(KP1,3)+A?(KP2,2)-QM(KP2,3)+A2(KP1,2)
C	
•	AC=SQRT(DOTF20(PZ(1),PZ(2),PZ(3),PZ(1),PZ(2),PZ(3),PZ(3)))
С	
	00 155 ICOPNERIA
	GO TO (5502,5504,5506,5708),ICORYR
5502	CONTINUE
	SIGN12=-1.
	ICSI+1
	IETA=2
	60 TO 5510
5504	CONTINUE
	SIGN12x+1.
	ICSI=1
	IEIA-1
5506	60 TO 5510
3546	SIGNIZ=-1.
	ICSI=2
	IETA=1
	GO TO 5510
5508	CONTINUE
	SIGN12-A1-
	ICSI*5
	IETA=2
5510	CONTINUE
	00 5528 K=1,3
	QW(K) = O(K, TCORNE)
	A1V(K)=A1(K,IETA)
	AZVIK) #AZIK, ICSI)
	QCRA1 (K)=QMCRA1 (K, IETA)
	OCRAS (K) #QHCSAS (K, IGSI)
	CONTINUE
5520	OUNT & NOC
5520 C	
	QQ=SQRT(DOTPRO(QV(1),QV(2),QV(3),QV(1),QV(2),QV(3)))

3	CALL LOGITCORNA, QQ, QV, A'V, QCRAZ, ALOGZ, 2)
C	TANPER
	IF (QDOTUN.EQ.0.)GO TO 5:30
	HNUMER == DOTPRO(QCRA1(1), 1CRA1(2), 1CRA1(3), QCRA2(1), QCRA2(1), QCRA2(3))
	DENOMEDOPOBOTUMPA1CRA2(T:ORMP)
-	IF (DE NOM.NE. 8.) TANP=ATANP (HNUMER, DE NOM)
5550	CONTINUE
C	WALLANG
•	COFFF1=DOTPP3 (IN(1) - IIN(2) - IIN(3) - 222A1 (1) - OCPA1(2) - 3CPA1(3)
	COEFF2=DOTPR3(UN(1), UN(2), UN(3),QCRA2(1),QCRA2(2),QCRA2(3))
C	COEFFE-BOTPRS CONTS , UNITS , DUNCT , SQURAZE LS , SQURAZE S , SQURAZE S ,
	SRCINT=-CONST*SIGN12*
	(-COEFFE PALOGI + COFFF Z PALOG Z - Q DO T IN T TAND)
C	
•	GO TO (801,802,803,804), ICHECK
801	CONC-1.0
001	50 TO 850
802	CONC=CSTAG
006	60 TO 450
803	CONC= CVORT
•••	SO TO ASA
ADA	CONC=1.0
	CONTINUE
	DBTINT=-CONST+SIGN12+TA-P+CONC
•	SGNINT=1.
C	
	NNN=I+(J-1)+NELEM
<u>c</u>	
	AA (NNN) =AA (NNN) -SGNINT T) TINT
C	
C	
	IFIICHECK.NE. 11GO TO 600
	UFREE =UN ACH+1117.
	OMEGAX = 0.
	OMEGAY=0.
	OMEGAZ=OMEGA+2.+RI/60.
	RX=PC(1,J)
	-XY=9C(2,J)
	RZ=PC(3,J)
	SCX=XPROX(OHEGAX,OHEGAY, DHEGAZ,RX,RY,RY,RZ)
	BCY=XPROY (OMEGAX, OMEGAY, OMEGAZ, RX, RY, RZ)
	BCZ=XPROZIOMEGAX,OMEGAY, DMEGAZ,RX,RY,RZ)
	BCR=DOTPRO(BCX, BCY, BCZ, J (1), UN(2), UN(3))
	IF (KROTOR (J), EQ.A) BCR='.
	BCB=-1. FUFREE FUN(1)
	AC(J) = BCR+ BCR
-	SOURCE (I) = SOURCE (I) + SGNE YT + SRCINT BC (J)
	CONTINUE
0	
150	CONTINUE
155	CONTINUE
-	CONTINUE

170	CONTINUE	
140	CONTINUE	
C		
	RETURN	
	ENO	

C	
	SUBROUTINE LOG(ICORNR, Q2, QV, AV, QCRAV, ALOG, ICOOR)
•	DIMENSION AV(3),QCRAV(3)
c	OOTPRO(X1,Y1,Z1,X2,Y2,Z?) =X1*X2+Y1*Y2+Z1*Z2
	AVAV=DOTPRO(4V(1), AV(2), AV(3), AV(1), AV(2), AV(3))
	QQAV=DOTERO(3V(1), QV(2), 3V(3), AV(1), AV(2), AV(3))
	QXA=SQRT (DOTPRO (QCRAV(1), QCRAV(2), QCRAV(3).
	1 OCRAVIII OCRAVIZI OCRAVIZI
	ALOG=ASINH(QQAV/QXA)/SQRT(AYAY) RETURN
	ENO

Č		
-	FUNCTION ATAMP (HNUMER, DE NOM)	
	ADEMON-ARS (DEMON)	
	ATANP=ATANZ (HNUHER, ADEND 1)	
	TECHEMON IT . O.) ATANDREATAND	
	RETURN	
	FNO	

ç	
	SUBROUTINE AFERAG (SOURCE, SOR, PC, NELEN, NO DE, NOFCT, NXYMF, HNODE,
	DIMENSION SOURCE (NELEM), 5 OR (MNODE), AVG (MNODE), PC (3, NELEM) DIMENSION MODELA, NELEM), NOFCT (MYMP, 34)
	COMMON/ZZZ1/NX(34),NY(35),NXY(34),KSYMHY,KSYMHZ,NSYMHY,NSYMHZ COMMON/ZZZ2/NSEX,NSBODY,NS,NT(36),ISFACE(36),KNORM(36),KNAKES(36
	COMMON/ZZZ3/4PYLON, NBODYL, NBODYZ, NBODYZ, NYTAIL, NSHAFT, NHUB, NSHANK
	COMMON/ZZZ4/UMACH, OMEGA ALFA, ABETA
	COMMON / ZZZS/YRYCIR, YRYCZ + ZEYCIR, ZX BYL, ZYBYL, RZBYL
	COMMON/ZZZ6/XNOSE, XBD1, X3D2, XTAIL COMMON/ZZZZ/XNOSE, YBD1, C3D2, YTAIL
	COMMON/ZZZ8/ZNOSE, ZBO1,Z3D2, ZTAIL
	COMMON/2279/RY801, 22801, 24802, 87802
	COMMON/ZZZ18/RSHAFT, LSHAFT, RSHANK, LSHANK
	COMMON/ZZZ11/XHUBCR, YHUP CR, ZHUBCR, RXHUB, RYHUB, RZHUB
	COMMON/ZZZ12/RROTOR, BCHDRD, TAUGL, ALFAG
	COMMON /27213/THETZE, THET LC, THETES, CONTING, AZIMUTH
	COMMON/ZZZ14/KBLADE, TANLEB, TANTEB, XBLE, XBTE, KROTORS (34)
	COMMON/27718/WSPAN, XLEZI, XTEZU, TANLEY, TANTEY, TAU, ZHT ATL
	COMMON/ZZZ16/NWAKPY, NWAC 18, NWAKSK, N WAKSL
	COMMON/ZZZEZ/MAKLDY, MAK 48, MAKLEK, MAKLE COMMON/ZZZES/MANGPY, MAN; 48, MANGSK, MANGBL
	COMMON/22210/ WARGET, WAR, 48, WARGST, WARGEL
	COMMON/ZZZZO/PI
	COMMON/27721/KPYL.KRY2
	COMMON/ZZZZZ/KNSELE, KNST +P, KNSTYP
	COMMON/27723/KBDELE, KBDS 48, KBDTY2
	COMMON/ZZZZ4/KTNELE, KTNS 1P, KTNTYP
	COMMON/27725/KPYFLE, KPYCHP, KPYTYP
	COMMONIZZZ86/KETELE, KYTS 4P, KYTTYP
	COMMON/27227/KSHELE, KSHE IP, KSHTYP
	COMON/ZZZ 28/KHBELE, KHBS HP, KHB TYP
	COMMON/27729/K SKEL F, KSKT/49, KSKT/49
	COMMON/ZZZ38/KOLELE, KOLS1P, KOLTYP COMMON/ZZZ38/KOLELE, KOLS1P, KOLTYP
	INTEGER FM. PP
	REAL LISHAFT LISHAHK
C	
	DO SE INCOES, NNODE
	AVG(INODE) =0.
90	SORLINCOEL &
	00 188 IELEM=1, NELEM
	PR-MODE (1, JELEM)
	PH=NODE (2, IELEH)
	MP-NODE (3, IELEM)
	MM=NODE (4, IELEM)
	SOR(PP) #SOR(PP) +SOURCE (I ELEM) SOR(PM) #SOR(PM) +SOURCE (. ELEM)
	SOCIAL SOCIAL SOCIAL CONTROL OF THE
	SOR(HH)=SOR(HH)+SOURCE ("ELEH)
	ANGIDE LANGIZED AL
	AVG(PH)=AVG(PH)+1.
	AVG(MP) RAVG(YP) 61.
	AVG(MM) =AVG(MM) +1.

	CONTINUE DO 118 THOREST NHORE	
110	SOR(INCDE) = SOR(INODE) / AVG(INODE)	
	SOR(1)=0.0 SOR(2)=0.0	
	RETURN	

<u> </u>	SUBROUTINE PHI (SOR, NMODE, NODE, PHIC, PHI 1, PHIZ, PHIZ, NELEN)
	DIMENSION SOR (NNODE), PHIC (NELEM), PHIL (NELEM), PHIZ (NELEM)
	DINENSION NODE (4, NELEM)
	COMMON 2221 MX (36) , NY (31) , NYY (36) , KSY MMY , KSYMYZ , NSYMYY , NSYMYZ
	COMMON/ZZZZ/NSFX, NS 80DY, YS, NT (34), I SF4 GE (34), KNORML (34), KHAKES (34)
	COMMON/ZZZZXMBYLON,MBOOK1,MBODYZ,MBOOK3,MYTAIL,MSHAFT,MHUB,MSHANK
	1 NBLADE
	COMMON/ZZZA/UMACH, OMEGA, ALFA, ASETA COMMON/ZZZS/XPYCTR, YPYCTR, ZPYCTR, ZXPYL, RYPYL, RZPYL
	COMMON/2778/YNOSE-YBOL/302-XTATL
	COMMON/ZZZ7/YNOSE, YBD1, 1902, YTAIL
	COMMON / 7778 / 7NOSE . 7801 . 7302 . ZYATI
	COMMON/ZZZ9/RY8D1, RZ8D1, RY8D2, RZ3D2
	COMMON/ZZZ LOVRSHAFT, LSHLFT, RSHANK, LSHANK
	COMMON/ZZZ11/XHU9CR, YHU3CR, ZHU8CR, RXHU8, RYHU3, RZ4U3
	COMMON / ZZZ12/ RROTO2, BCH: 20, TAUBL, AL FA 3
	COMMON/ZZZ13/THET/S, THE 1C, THET1S, CONING, AZIMUTH
	COMMON/27215/KBLADE, TAN :8, TANTES, XBL:, XBTE, KROTORS(34) COMMON/27215/VSPAN, XLEZV, XTEZV, TANLEV, TANTEV, TAU, 7VTAIL
	COMMON / 22212 / AZEN YETS / YIETS / YINGES / JAMES /
	COMMON/ZZZ17/WAKLPY, WAK. 18, WAKLSK, WAKLBL
	COMMON 277 18 / MANGRY, MANGAR, MANGEY, MANGE
	COMMON/ZZZ19/KPRINT(10), VREAD, NWRITE, KREAD
	COMM OM /27720/91
	COMMON/ZZZZ1/KPY1,KPY2
	COMMON/ZZZZZ/KHSELE, KMSS4P, KMST4P
	COMMON/ZZZZ3/KBOELE, K305 HP, KBOTY>
	COMMON / 2223A / KINELE, KINE 49, KINIYA
	COMMON/ZZZ25/KPYELE, KPYS 1P, KPYTY? COMMON/ZZZ26/KWTELE, KYES 1P, KWTTYP
	COMMON/ZZZZ7/KSHELE, KSH6 HP, KSHTYP
	COMMON / 22228 KHBELE, KHB 4P, KHB TYP
	COMMON/ZZZZ9/KSKELE, KSKS 1P, KSKTYP
	COMMONAZZZZZZKARUELE, KOLEAR, KOLEYZ
	COMMON/ZZZ31/NSTAG, NVORT, NSPIRAL, SPIRAL
	INTEGER PM, P?
	REAL LSMAFT, LSMANK
	DO 701 TELEM-1, NELEN
	PP=NQ DE (1, IEL EN)
	MP=NODE (3, IELEM)
	MMANO DE (A. TEL EN)
	PHIC (IELEH) = (SOR (PP) +SO* (PM) +SOR (MP)+SOR (MM))/4.
	AMT1 (TELEM) = (SOR (PR) ASO2 (PM) -SOR (4P) -SOR (MM1) /4.
	PHIZ (IELEH)=(SOR(PP) -SOR(PN)+SOR(HP)-SOR(HM))/4.
	BHIRLEHIA (SOR(BR) -SOR (BM) -SOR (ME) A-SOR (MM)) /A-
701	CONTINUE
	WALTE (6,719)
719	FORMAT (//6X, ELENO, 9X, SONICO, 11X,
	1 PONT 1 COX, PONT 20, GX, PONT (P)
744	DO 728 IELEM1.NELEM MRITE (6.721) [ELEM. BNIC (EELEM), BNIC (IELEM), BNIZ (IELEM), EMIR (IELEM)
721	FORMAT (5x, 16, 5x, 6E15, 5)
,	OFTIOM OFTIOM
	ENO

C	
	SUBROUTINE VELXYZ (VELX, FLY, VELZ, SHI1, BHI2, BHI3, PC, R1, R2, R3,
	1 NELEN)
	DIMENSION PHIS(NELEM), PHIS(NELEM), PHIS(NELEM) DIMENSION PHIS(NELEM)
	DIMENSION WE Y (NEL EN) WE Z (NEL EN)
	DIMENSION PC(3, NELEM), P1(3, NELEM), P2(7, NELEM), P3(3, NELEM)
	COMMON/7771/4X(36) MY(36) MYY(36) KSYMMY KSYMMY MSYMMY MSYMMY
	COMMON/ZZZZ/NSFX, NSBODY, NS, NT(34), I SFACE(34), KNORML(34), KNAKES(34
	COMMON/7773/APYLON, NBODY 1, NBODY 2, NBODY 3, NYTAIL, NSMAFT, NHUB, NSMANK
	1 NBLADE
	COMMON / 7774 / IMACH, ONEGA, ALEA, ARETA
	COMMON/ZZZ5/XPYCTR,YPYCTR,ZPYCTR,RXPYL,RYPYL,RZPYL COMMON/ZZZ5/XMOSF,XBD1,X3D2,XTATL
	COMMON/ZZZ7/YNOSE, YBD1,/302,YTAIL
	COMMON/2778/ZNOSE.ZRD1.Z3D2.ZTAT
	COMMON/ZZZ9/RYBD1,RZBD1,RYBD2,RZ3D2
	COMMON/22710/RSMAFT, LSM FT, RSMAMK, LSMANK
	COMMON/ZZZ11/XHU3CR, YHU3CR, ZHU8CR, RXHU8, RYHU8, RZHU3
	COMMON/22712/RROTOR, BCMORD, TAUBL, AL FAR
	COMMON/ZZZ13/THET75, THET1C, THET1S, CONLNG, AZIMUTH
	COMMON/77714/ KBLADE, TAM EB, TAMTEB, XBLE, XRTE, KROTORS (14)
	COMMON/ZZZ15/VSPAN, XLEZV, XTEZV, TANLEV, TANTEV, TAU, ZVT AIL
	COMMON 277154NHAYRY, NHACHS, NHAKSK, NHAKS
	COMMON/ZZZ17/MAKLPY, NAK. 48, MAKLSK, MAKL BL COMMON/ZZZ18/MAMGPY, MAM. 48, MAMGSK, MAMG BL
	COMMON/ZZZ19/KPRINT(10), WREAD, NWRITE, KREAD
	COMMON / 77729/81
	COMMON/ZZZ21/KPY1,KPY2
	COMMON ZZZZZZ KNSELE, KNSE4A, KNSEYA
	COMMON/ZZZZ3/KBOELE, KBOS 1P, KBDTYP
	CONMON / 7772M KINELE, KING 4P, KINTYP
	COMMON/ZZZZS/KPYELE, KPYS+P, KPYTYP
	COMMON/ZZZZ%/KYTELE, KYTS4P, KYTTYZ COMMON/ZZZZ7/KSHELE, KSH5 4P, KSHTYP
	COMMON/7272A/KMAFI E. KHRIHP. KHRIHP
	COMMON/ZZZZ9/KSKELE, KSKS 1P, KSKTYP
	COMMON/77730/KBLFLF-KBLS1P-KBLTVP
	COMMON/ZZZ31/NSTAG, NVORT, NSPIRAL, SPIRAL
C	
	DOTPRO(X1, X2, X3, Y1, Y2, Y3) = X1 - Y1 - X2 - Y2 - X3 - Y3
	WECRRY(01,02,03,51,62,63) = 02463-03462
	VECPRY(D1,D2,D3,E1,E2,E3)=03*E1-D1*E3
•	WECRR 7101, 02, 03, E1, E2, E31 =019E2=029E1
S	DO ARE IFI FMAR MEI FM
C	DO ARR JELEM=1; NELEM
	ALYCARIAL IFI CHI
	A1YC=P1(2, JELEH)
	A17C=P1(3, IFI FM)
	AZXC=PZ(1,JELEN)
	AZYC+92(2, JELEN)
	AZZC=PZ(3,JELEH)
	A1XAZX=VECPRX (A1XC, A1YC, A1ZC, AZXC, AZYC, AZZC)
	A1XA2Z=VECPRZ (A1XG, A1YG, A1ZG, A2XG, A2YC, A2ZG) A1XA2Z=VECPRZ (A1XG, A1YG, A1ZG, A2XG, A2YC, A2ZG)

C	A1XA25=00TPR0(A1XA2X_A1XA2X_A1XA2Z_A1XA2X_A1XA2X_A1XA2Z)
	A 1 XAZ A=SQRT (A 1 XAZS)
	A1A1=DOTPRO(A1XG, A1YC, A1ZC, A1XG, A1YG, A1ZC)
	A1A2=DOTFRO(A1XC, A1XC, A1XC, A2XC, A2XC, A2XC)
1913 13	AZAZ=DOTPRO(AZXG, AZYG, AZZG, AZXG, AZYC, AZZC)
	A11=A2A2/A1XA25
	A12x-A1A2/A1XA2S
	A21=A12
	A22=A1A1/A1XA:\S
C	
	UNORHX: A1XA2X/A1XA2A
	UNORHY=A1XA2Y/A1XA2A
	IINORMZ=A1XA2Z/A1XA2A
C	
	A 1 VIII- A 1 1 5 A 1 VC A A 1 2 B A 2 V C
	A1YU=A11*A1YC+A12*A2YC
	A17U=A11*A17C+A12*A27C
C	
	A2112 A216A11C+A228A21C
	AZYU= AZ1°A1YC+AZZ°AZYC
	A27Ua A219A17CAA229A27C
C	
	ASYUMUNOPHY
	A3YU=UNORMY
	A 3711=11NOPM7
C	
	VELYCIELEN SONT COLE ENTE A TYLIADATZCIELEN SA ZYLI
	VELY (JELEN) =PHI1 (JELEN) + 1 YU+PHI2 (JELEN) + AZYU
	VELTIJELEN) SPHT 1 (JELEN) FA 1 7114 PHT2 (JELEN) FA 27114 PHT3 (JELEN) FA 3711
800	CONTINUE
	PETHEN
	END

	SUBROUTINE CPLINR(CP, VE.X, VELY, VELZ, PHIC, NELEM, PC, KROTOR) DIMENSION GP(NELEM), VELX(NELEM), PHIC(NELEM)
	DIMENSION VE.Y(NELEM), VE.Z(NELEM)
	DIMENSION PC(3, NELEN) . KOOTOR (NELEN)
	COMMON/ZZZ1/NX (36) , NY (34) , NXY (36) , KSY MY, KSYMMZ, NSYMMY, NSYMMZ
	COMMON/7772/MSEX, MSROOM, MS, MT(3A), I SEACE (3A), KNORM (3A), KWAKES (3A)
	COMMON/ZZZ3/MPYLON, NBODY L, NBODYZ, MBODY 3, MVTAIL, NSH4FT, NHUB, NSHANK,
	COMMON/ZZZ4/JMACH, OMEGA, ALFA, ABETA
	COMMON/2775/XPYCTR, VDYCT1, ZDYCTR, RXPYL, RXPYL, RZPYL
	COMMON/ZZZ6/KNOSE, XBD1, 4302, XTAIL
	COMMON/ZZZA/ZNOSE, ZBO1, Z3O2, ZTAIL
	COMMON/7779/RYR01.27801.27802.27302
	COMMON/ZZZ10/RSHAFT, LSH. FT, RSHANK, LSHANK
	COMMON/77711/XHU8C2, YHU3CR, ZHUBC2, RXHUB, ZYHUB, ZZHUB
	COMMON/ZZZ12/RROTOR, BCHD RD, TAUBL, AL FA 9
	COMMONAZZZSTATETZS, THETEC, THETES, CONING, AZZMUTH
	COMMON/ZZZ14/KBLADE, TANLEB, TANTEB, XBLE, XBTE, KROTORS (34)
	COMMON 277 15 USPAN, XLEZV, XTEZN, TANLEV, TANTEV, TAU, ZVTAIL
	COMMON/ZZZ16/NMAKPY,NMAK48,NMAK5K,NMAKBL
	COMMON / 27717/ MAKI PY, MAK 48, MAKI SK, MAKI SK
	COMMON/ZZZ15/WANGPY, WAN: 48, WANGSK, WANG BL
	COMMON/ZZZZO/PI
	COMMON/77771/KPY1.KPY2
	COMMON/ZZZZZ/KNSELE, KNSS4P, KNSTYP
	COMMON / ZZZZÝ KBOEL E. KBOE 48 KBOTY?
	COMMON/ZZZ24/KTNELE, KTNSHP, KTNTYP
	COMMON / ZZZZS/KPYELE, KPYE 4B, KPY FY3
	COMMON/ZZZ26/KYTELE, KYTS1P, KYTTYP
_	COMMON/77727/KSHELE, KSH. 49, KSHTY3
	COMMON/ZZZ28/KHBELE, KHBS 1P, KHB TYP
_	COMMON/ZZZ29/KSKELE, KSK34R, KSKTY2 COMMON/ZZZ30/KBLELE, KBLSHP, KBLTYP
	COMMON/77731/NSTAG. NYORT, NSPIRAL. SPIRAL
Me in pain	DOTPRO(X1,Y1,Z1,X2,Y2,Z2)=X1*X2+Y1*Y2+Z1*Z2
	X PROX (OX , OY , OZ , EX , EY , EZ = OY* 5Z = EY* 9 Z
	XPROV (DX,DY,)Z,EX,EY,EZ =DZ*EX-EZ*DX
	XRROZ (DX,DY,3Z, EX,EX,EX,EX = 0.4 EY = 6.4 D.Y
	BETAZA=ABS(1UMACH++2)
	BETA-SQRT(BSTA2A)
	UFREE =UHACH=1117
	OMEGAY=8.
	OMEGA 7=0MEGA
	OMEGAZ=OMEGAZ+2.*PI/60.
	TECHNACH.EQ.A) UFREE-ON :AP2. PRIPAROTOR/64.
	DO 980 IELEN=1.NELEM
	RYSPG (1. TELEN)
	RY-PC(2, IELEM)
	P.Z-P.C.(3, TELEN)
	AX=AETX(IETEM)
	WYEVELY (TELEN)
	VZ=VEL Z (IELEN)
	CPRs(-2,-HFBFFF4X-(VX4X(+VY4Y+W75Y7))/(HFRFF4HFRFF)

	CRX=XPROX (OMEGAX, OMEGAY,) MEGAZ, RK, RY, RZ)
	CRZ=XPROZ (OMEGAX, OMEGAY, DMEGAZ, RX, RY, Z)
- 121	CPR=GPF=2-/(JFREE*UFREE)
380	CP(IELEM)=CP8+CPR
	RETURN

	SUBROUTINE FORCE (NNODE, XX, NELEM, NODE, CP)
	DIMENSION A1(3),A2(3),XC(3,NNODE),NODE(5,NELEM),PC(3),CP(NELEM)
	COMMON/ZZZ1/4x(35),NY(34),NXY(35),KSY:HY,KSYMMZ,NSYMMY,NSYMMZ COMMON/ZZZ2/NSFX,NS800X-YS,NT(34),ISFACE(34),KNORHL(34),KMAKES(34)
	COMMON/ZZZ3/YPYLON, NBOOY1', NBOOY2, NBOOY3, NYTAIL, NSHAFT, NHUB, NSHANK,
	COMMON/ZZZ4/UNACH, ONEGA ALFA, ABETA
	COMMON/2275/XPYCTR, YPYCT2, ZPYCTR, RXPYL, RYPYL, RZPYL
	COMMON/ZZZ6/XNUSE,X8D1,X3D2,XTAIL
	COMMON ZZZZZYNOSE, YBO1, Y302, YTAIL
	GOMMON/ZZZB/ZNQSE,ZBO1,ZBD2,ZTAIL
	COMMON/7779/24801,27801,27802,27802
	COMMON/ZZZ10/RSHAFT, LSM FT, RSHANK, LSHANK
	COMMON/27711/XHUBCR, YHURCR, THUBCR, RYHUR, RYHUR, RYHUR
	COMMON/ZZZ1Z/RROTOR, BCHTRD, TAUBL, ALFA3
	COMMON/ZZZ13/THET73, THEFLC, THETLS, CONLING, AZZMUTH COMMON/ZZZ14/KBLADE, TAN. EB, TANTEB, XBLE, X9TE, KROTORS (34)
	COMMON/77746/ VSPAN, YLEZV, YTEZV, TANLEY, TANLEY, TANLEY, TANLEY
	COMMON/ZZZ16/NWAKPY, NWAK+B, NWAKSK, NWAKBL
	COMMON/77717/WAKI PY. WAK 48. WAKI SK. WAKI SK.
	COMMON/ZZZ10/WANGPY, WANG 18, WANGSK, WANGBL
	COMMON/77719/KPPINT(10)- VPEAD-NWRITE, KREAD
	COMMON/ZZZ20/PI
	COMMON/22720/KPY1_KBY2
	COMMON/ZZZZZ/KNSELE, KNSS+P, KNSTYP
	COMMON/22723/KROFLE, KAGS HP, KROTYP
	COMMON/ZZZZ4/KTNELE, KTNS+P, KTNTYP
	COMMON / ZZZ 25/ KRYELE, KRYE 4P, KRYEYP
	COMMON/ZZZZB/KYTELE, KYTS 1P, KYTTYP
	COMMON CZZZZZYKSHELE, KSIK AP , KSHTYP
	COMMON/ZZZZO/KHBELE, KHBS 1P, KHBTYP
	COMMON / ZZZ 29 / KSKEL E . KSKE 42 . KSKTY2
	COMMON/ZZZ30/KBLELE, KBL34P, K9LTYP
	COMMON/ZZZ31/NSTAG, NVORT, NSPIRAL, SPIRAL
	INTEGER PP,PH,MP,M4
	DOTPRO(X1, Y1, Z1, X2, Y2, Z?) = X1 - X2+Y1 - Y2 + Z1 - Z2
	XPROX (DX-DY-DZ-EX-EY-EZ) : DY-EZ-DZ-EY
	xPROY(DX,DY,)Z,EX,EY,EZ)=DZ+EX-DX+EZ
	XPROZ (DX,DX,DZ,EX,EX,EX) = DX * EY = DY * EX
C	
	BETA-SORT (1 UMACH-UMACH)
	MULT=1
	MULTZ=1
	IF(KSYMMZ.NE.O) MULTZ=2
	IF (KSYMMY-NE-8) MULT=2
	CLIFT=0.0
	CDRAC=0.0
	CH=0.0
	NO 188 JEL NELEN
	PP=NO DE (1, J)
	9HaNO DE (2, 1)
	HP=NODE(3, J)
	MM=MODE (A, J)
	50 000 V-1 •
	00 266 K=1,3
	00 288 K=1,3 YPP#YK(K,PP) YPM=XK(K,PM)

	YHP=XK(K,HP)
	A1(K)=(YPP+YPH-YHP-YHH)/\$.
	AZIK)=(YPP=YZMAYMP=YMM)/L
	PC(K)=(YPP+YPH+YHP+YHH)/
200	CONTINUE
	A1(1) =A1(1) +9ETA
	A2(1)*A2(1)*BETA
	PC(1)=PC(1)=BETA
	A1XA2X=XPROX(A1(1),A1(2),A1(3),A2(1),A2(2),A2(3))
	ALXA2Y=XFR0Y(AL(1),AL(2),AL(3),A2(1),A2(2),A2(3))
c	A1XA2Z=XFROZ(A1(1),A1(2),A1(3),A2(1),A2(2),A2(3))
	DELL= A1XA2Z
	CLIFT-CLIFT SCR (I) SDE LANULTSHULTZ
C	
	DELT-ALYARY.
2	CORAG=CORAG-+. +CP(J) +DE_J+MULT+MULTZ
180	CONTINUE
	AREA=1.
2	
	CLIFT=CLIFT/AREA
c	CORAG=CORAG/AREA
G	United Automatics and a company of the company of t
700	MRITE (MMRITE, 300) CLIFT
300	FORMAT(//10X, *LIFT COEFTICIENT =*,E12.6) MRITE(NMRITE, #81)CDRAG
301	FORMAT(//10x, *DRAG (IND)CED) COEFFICIENT =*,E12.6)
	END